VOL. XLIII. No. 2 FEBRUARY 1958

MECCANO MAGAZINE

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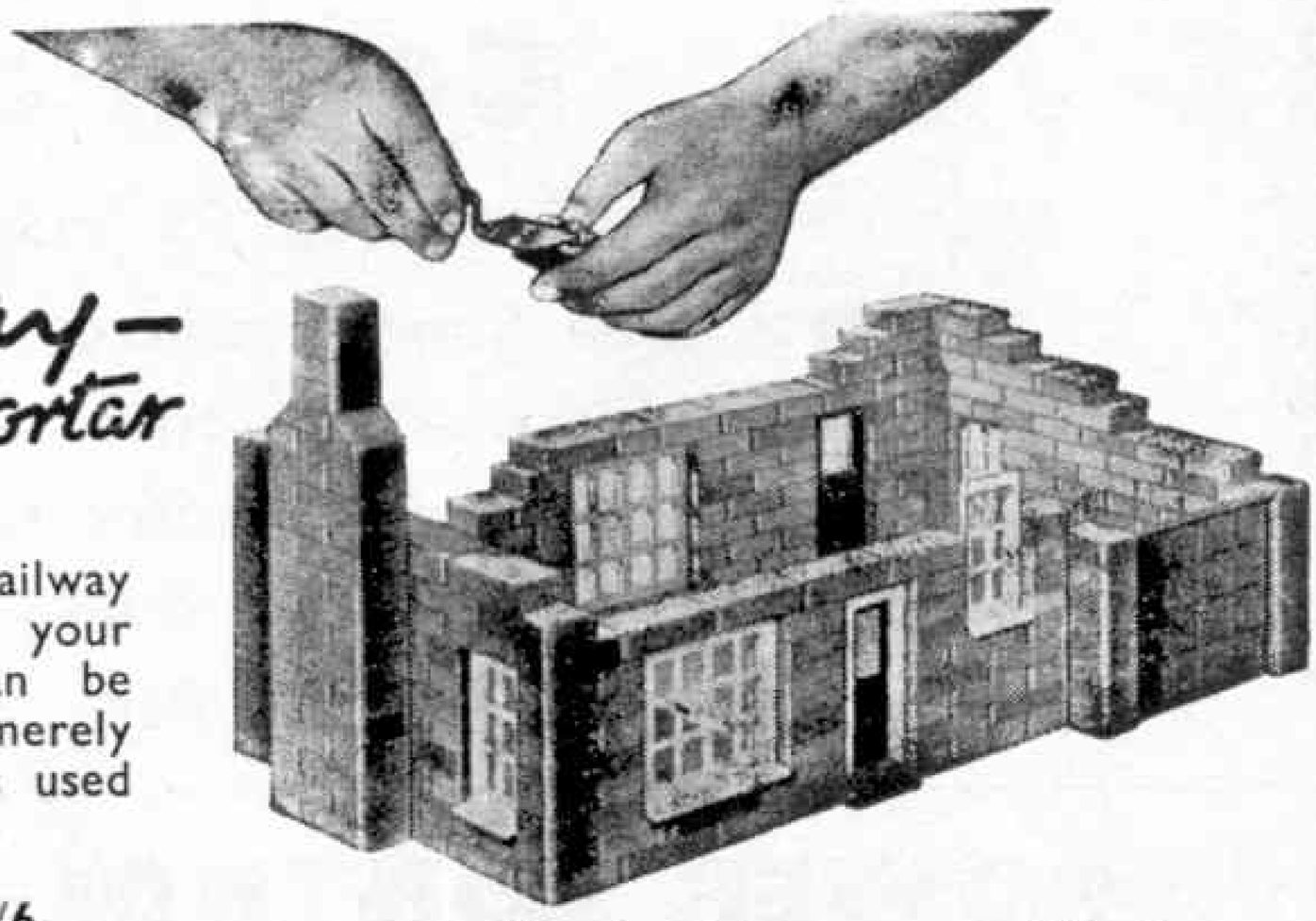

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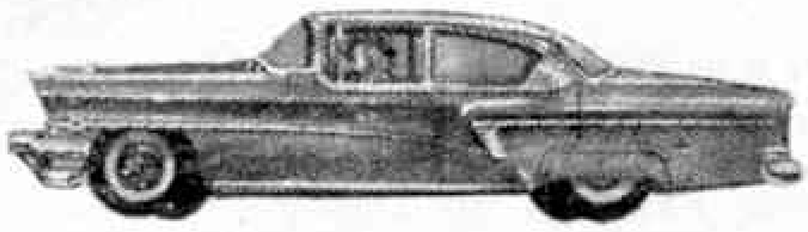

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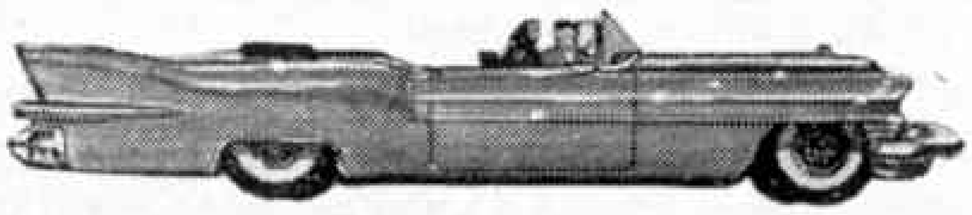

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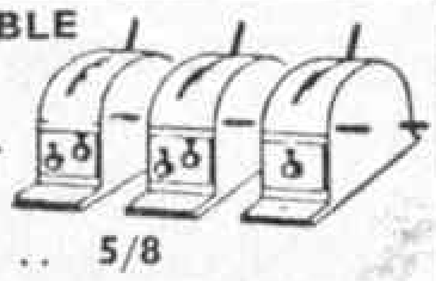

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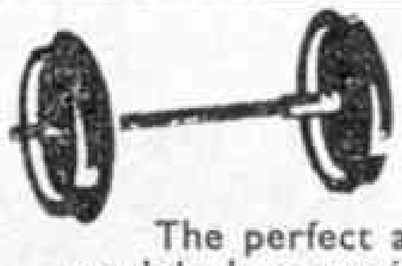

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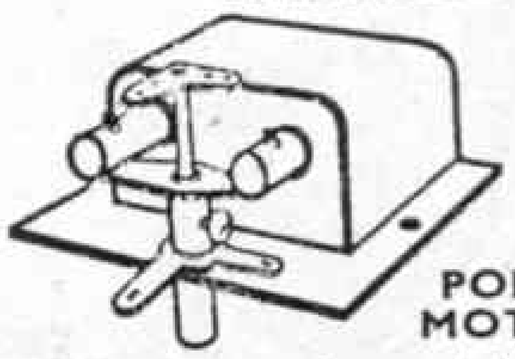

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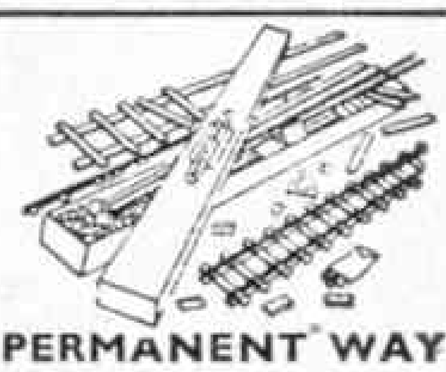

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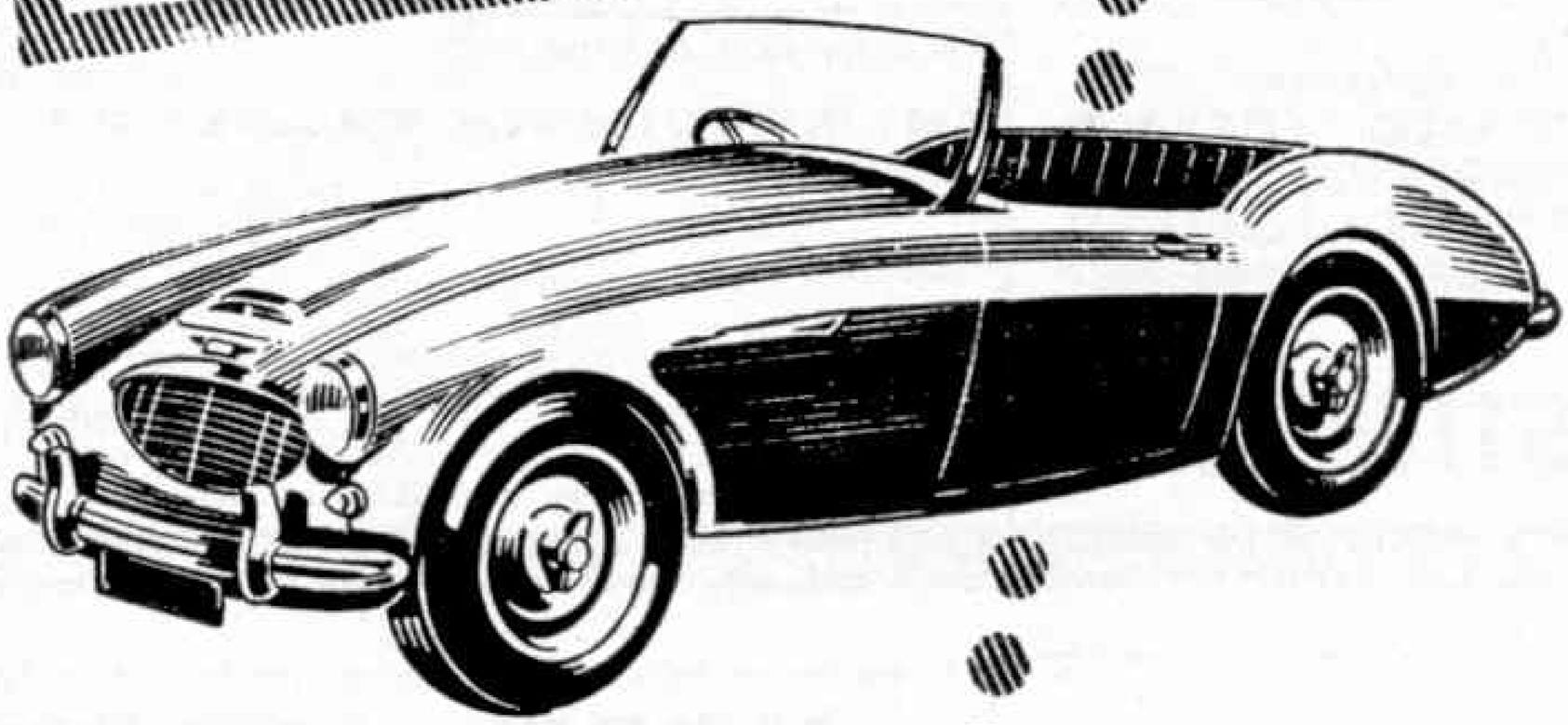

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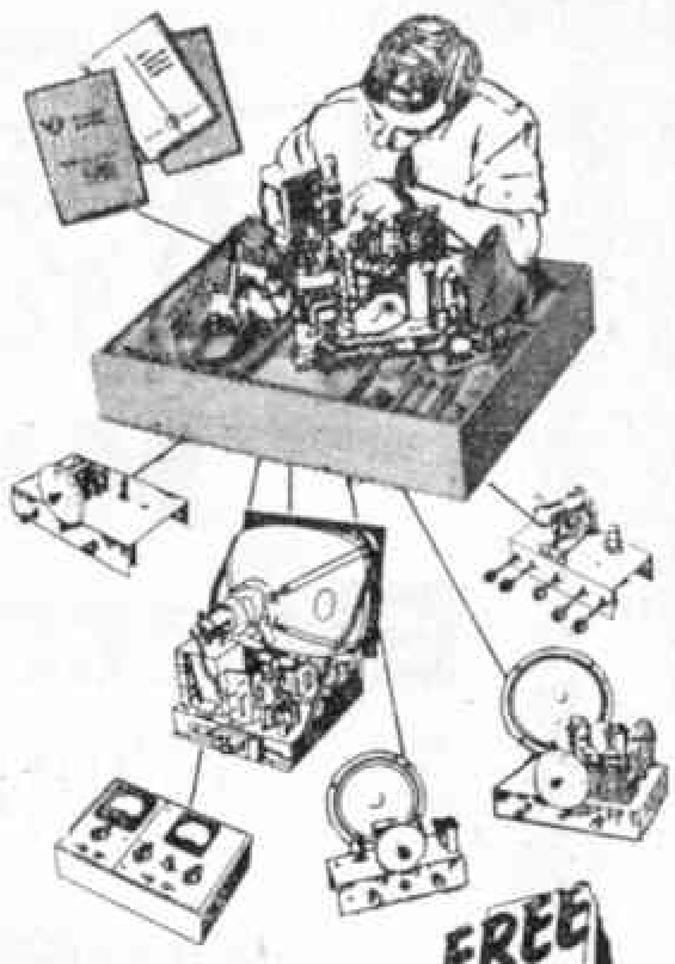

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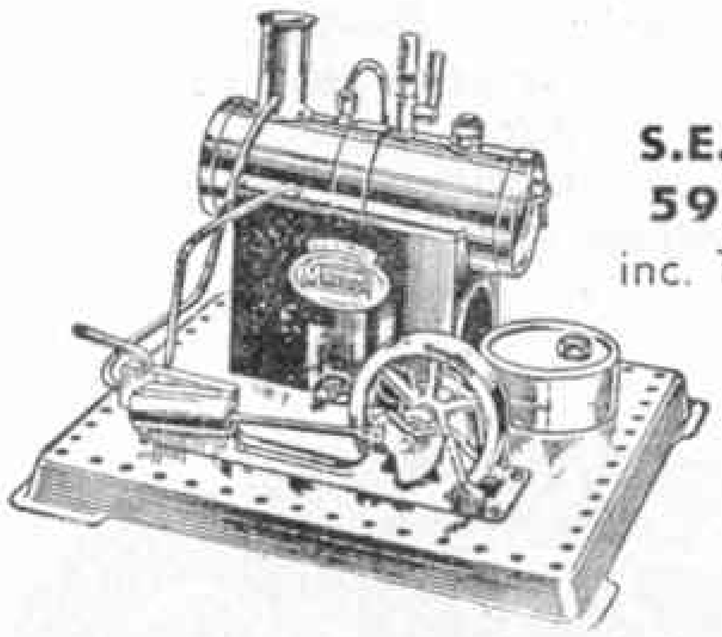

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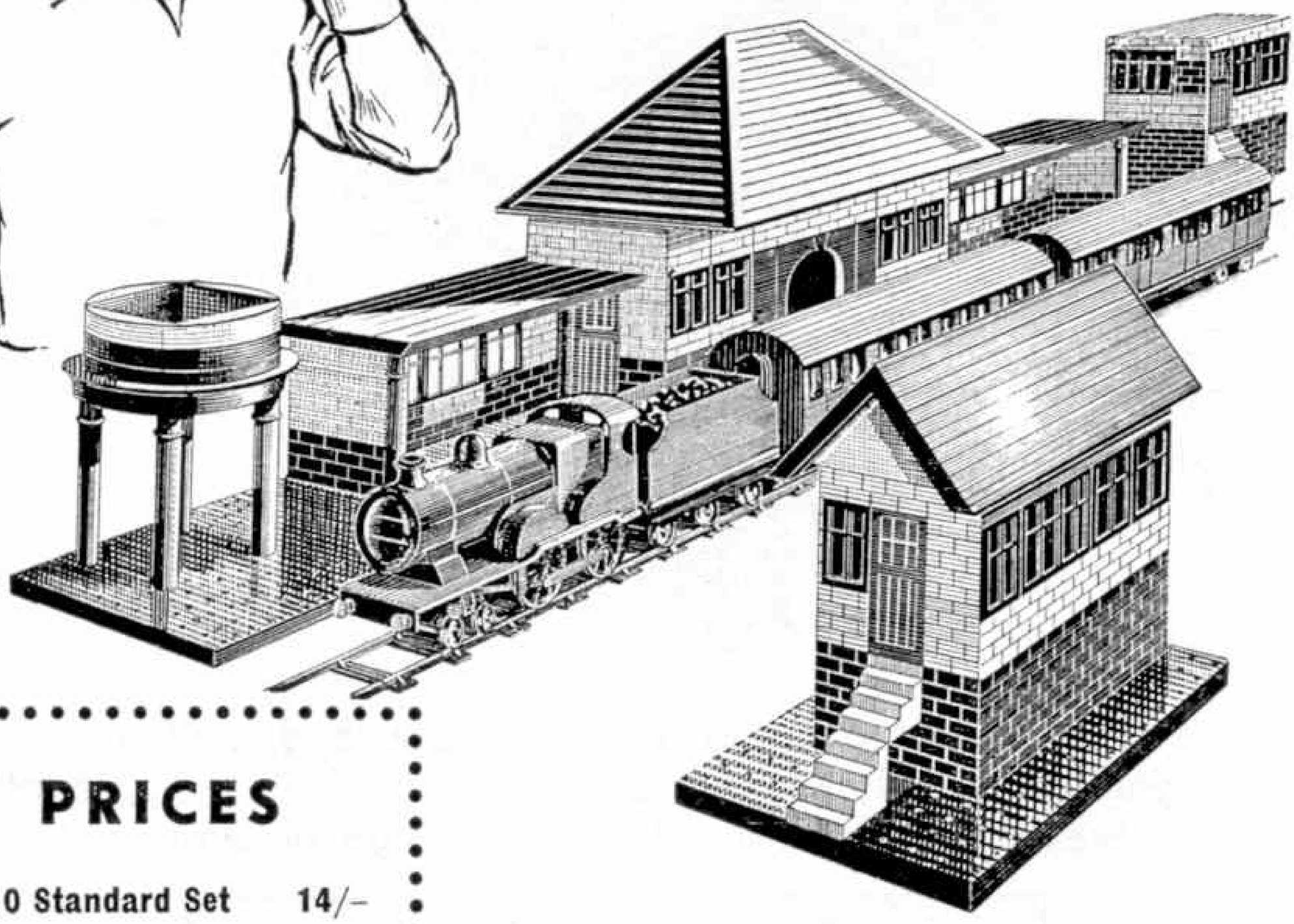

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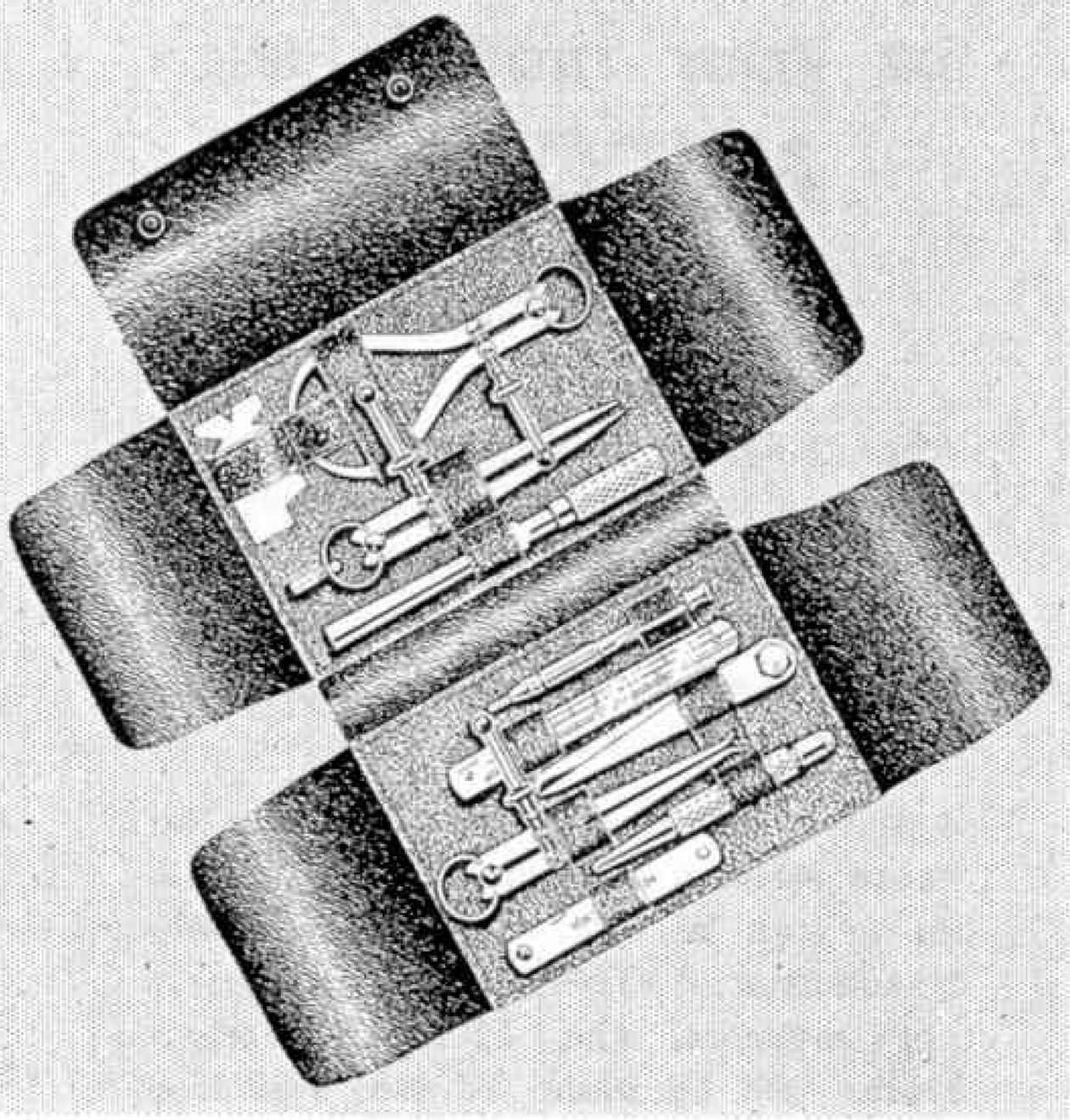

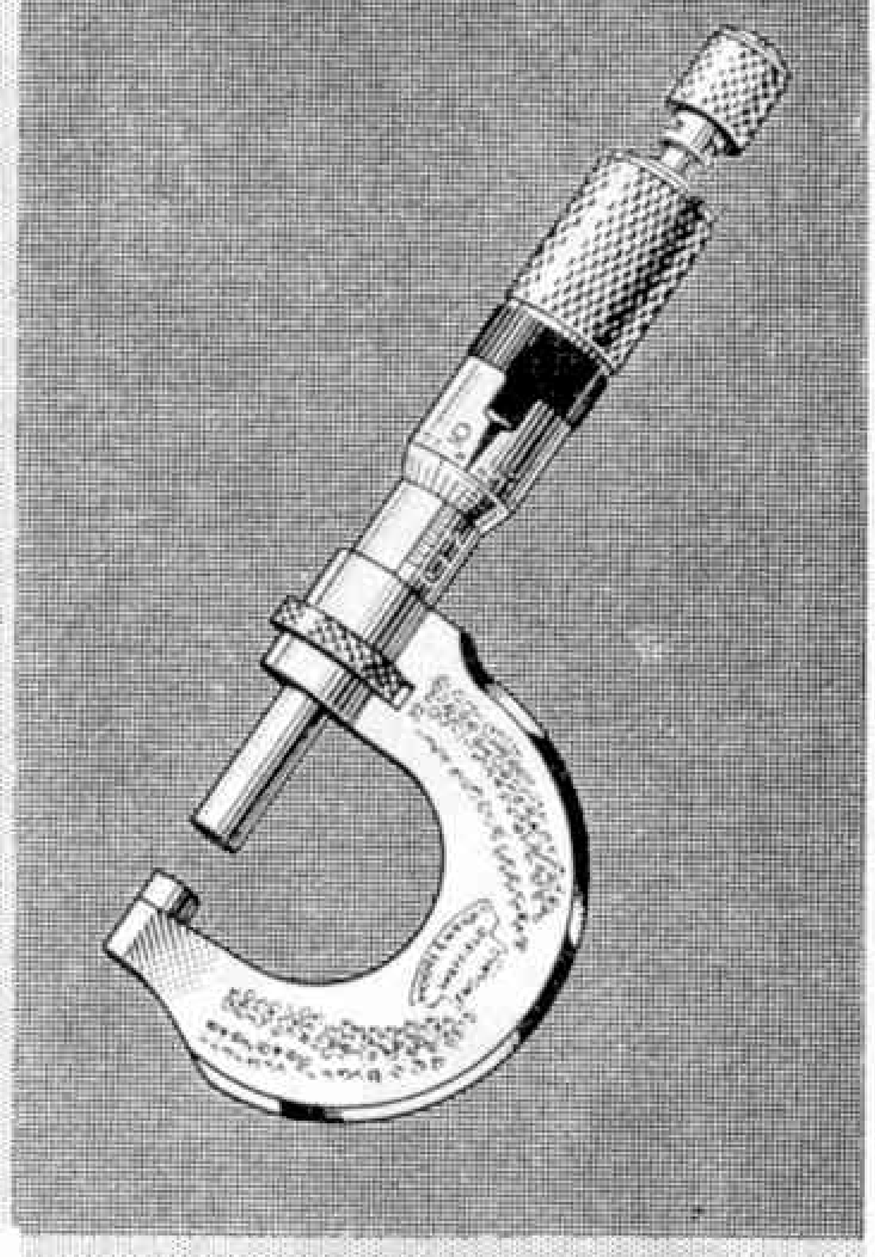

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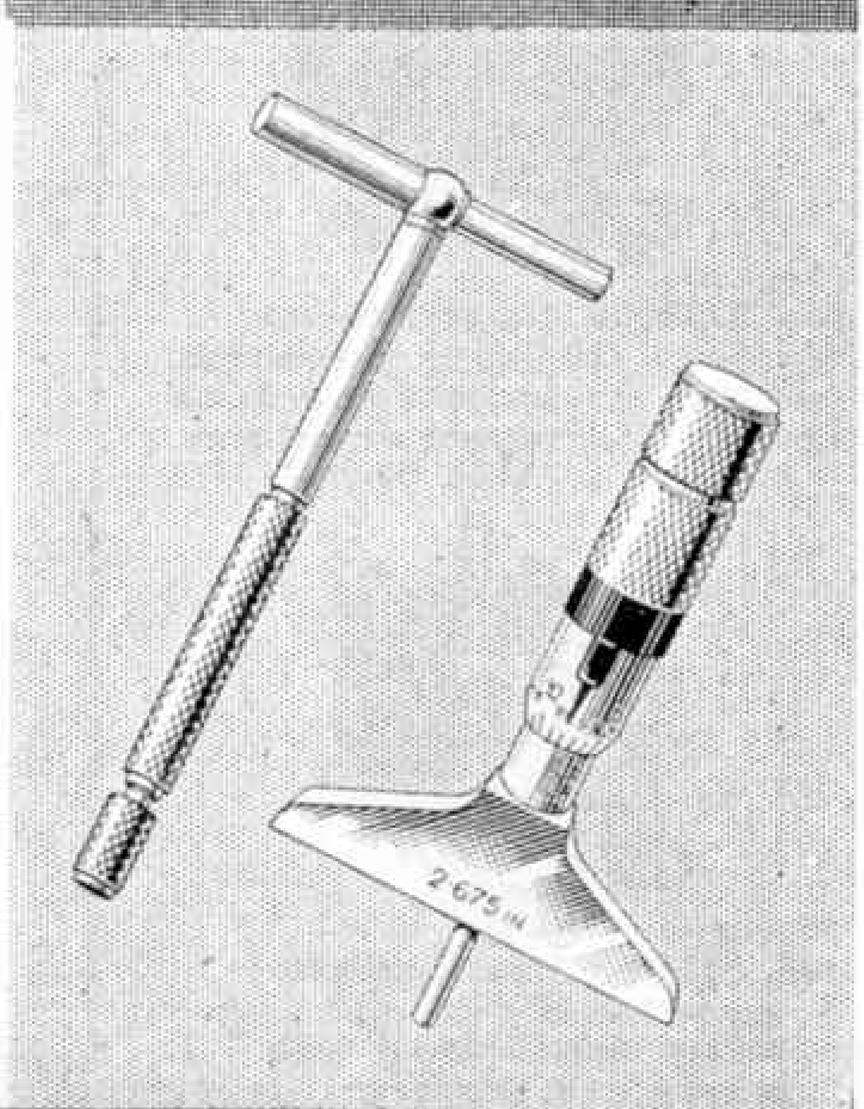

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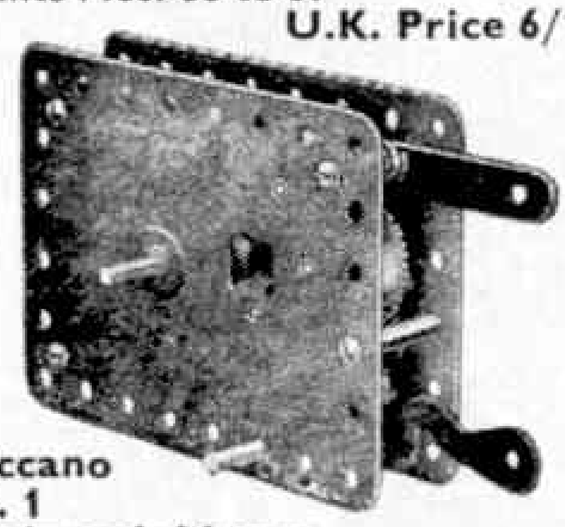

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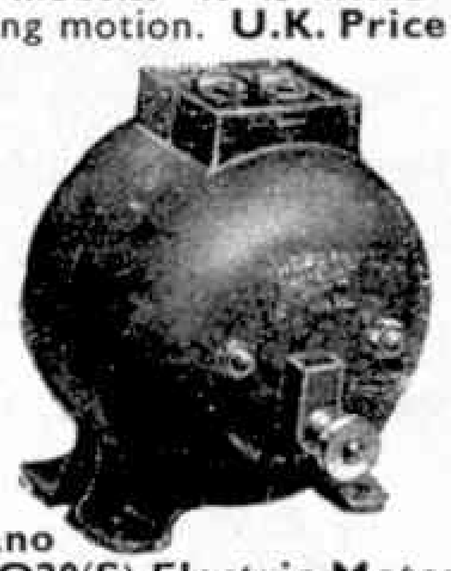

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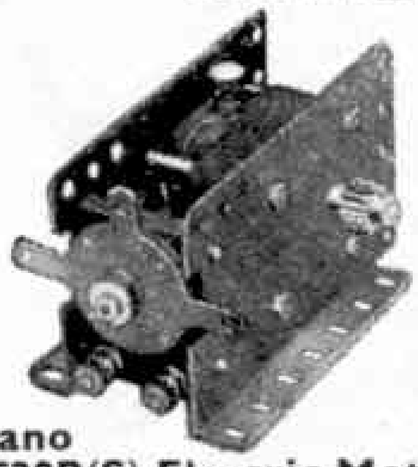

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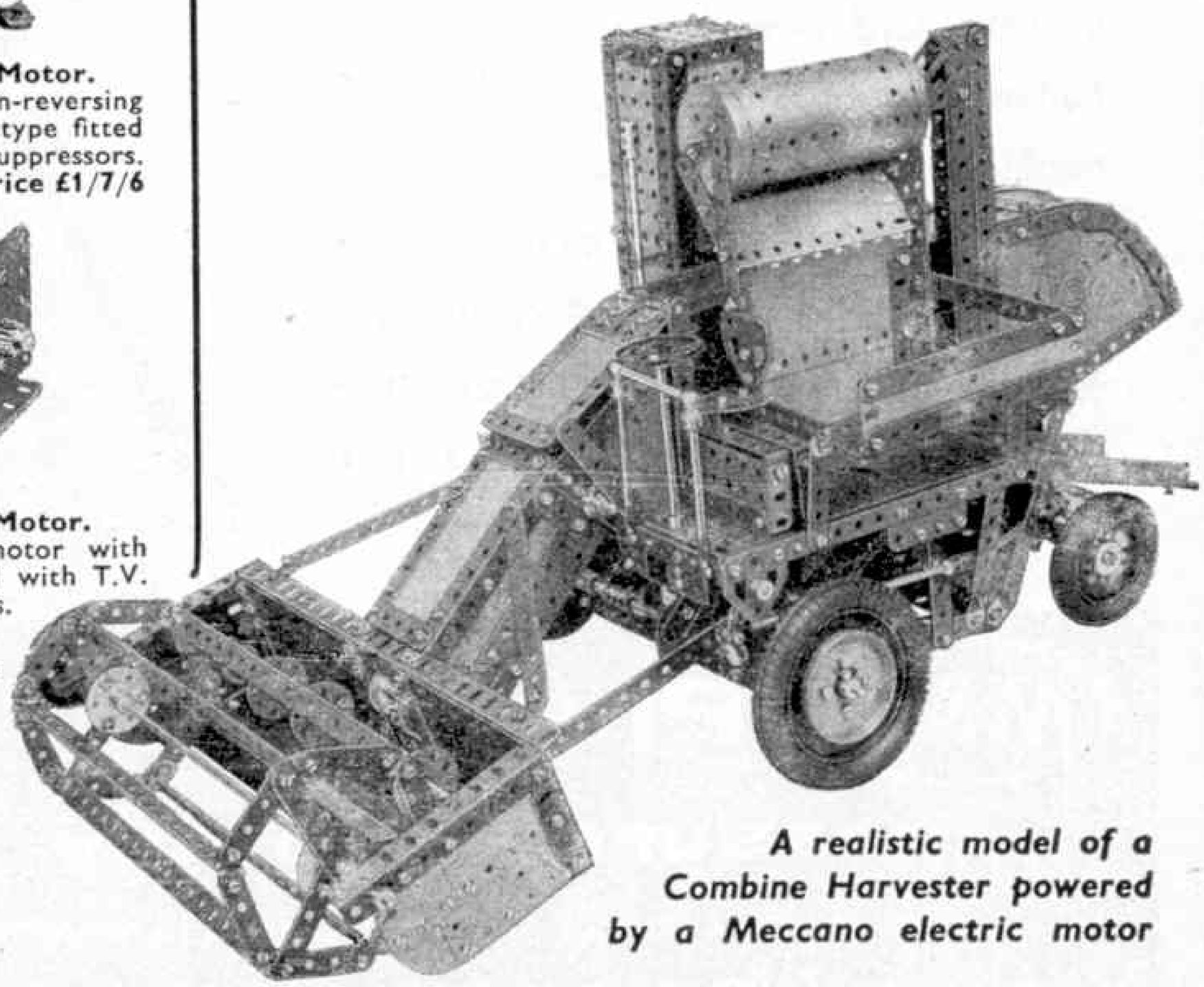

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Next Month: "TRIBUTE TO THE 'BRITANNIA'." By John W. R. Taylor

MECCANO MAGAZINE

Editorial Office:
Binns Road
Liverpool 13
England

EDITOR : FRANK RILEY, B.Sc.

Vol. XLIII
No. 2
February 1958

Outward Bound

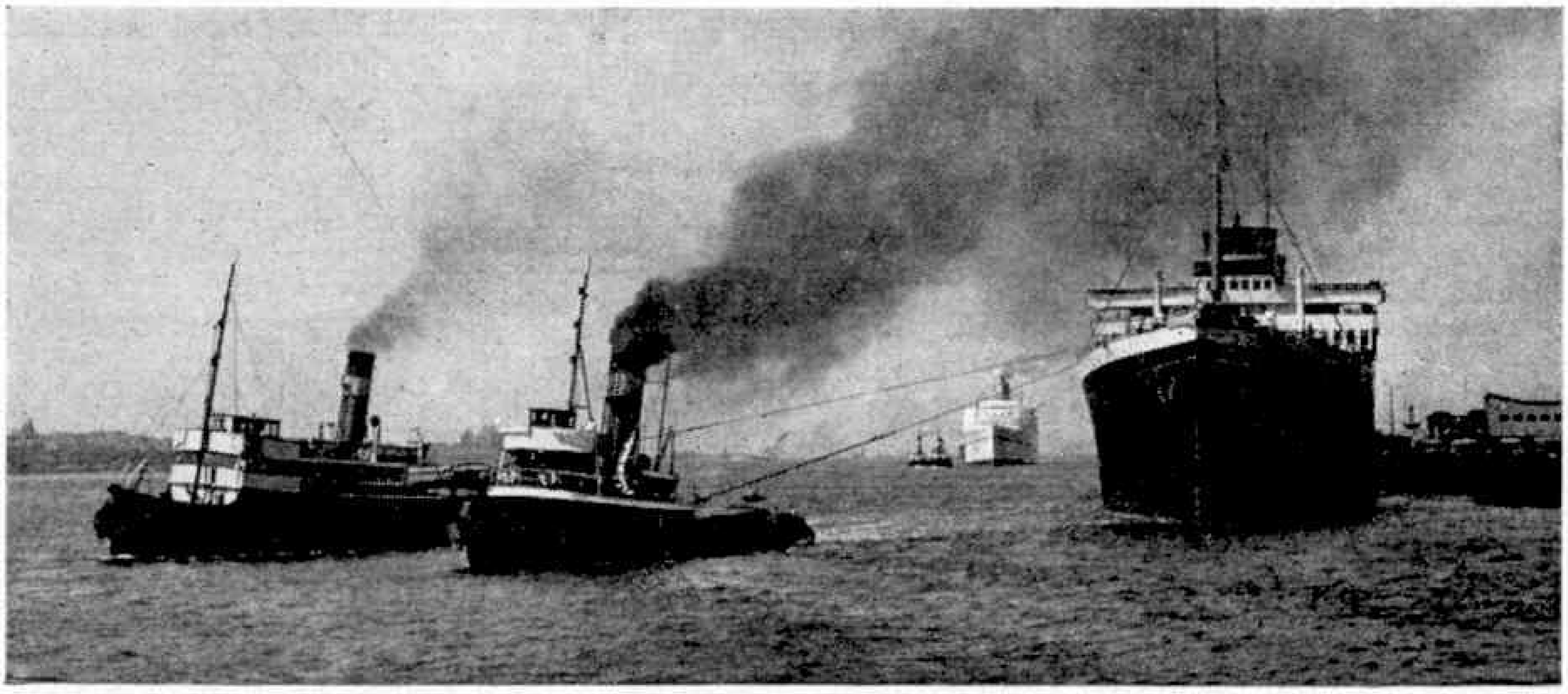
The picture on this page shows one of the scenes that enchant visitors to a great port. In this case the port is Liverpool, and on the right of the picture is the Landing Stage, alongside which liners berth to take on passengers or disembark them. The greatest thrill comes when tugs bring a liner in to the Landing Stage, or tow her out into mid-stream to start her voyage across the oceans.

The constant movement of a ship afloat, even if it is only a quiver caused by a rippling sea, helps to create the impression that she is alive. This impression is not lost even when a pair of powerful tugs, tiny in comparison, take her by the hand and lead her away so that she can sail out into the blue, always a romantic moment.

But now let me turn to transport on land. In one or two instances in recent years, railway enthusiasts have determined to do all they can to preserve treasured narrow gauge lines doomed to closure. The first of these efforts to be set afoot was concerned with the Tal-y-Llyn Railway, and its story will be told in the March *M.M.* The cover of that issue will show one of the colourful little tank engines of the line taking water at a wayside station, while passengers from the train move about and give every appearance of having a really wonderful time.

Don't miss next month's fine issue, in which there will be many other attractions, among them the story of a Dinky Toys Gloster Javelin that flew at a speed greater than that of sound! If you have not already placed a regular order with your Meccano dealer or newsagent, do so at once.

The Editor



This fine picture shows a scene in the Mersey Estuary at Liverpool, with the Cunard liner "Britannic" leaving the Landing Stage and the C.P.S. "Empress of Britain" in the distance. The latter vessel is seen alongside the Landing Stage on our cover, which is based on a photograph by W. S. Garth, Tyldesley, who also took the picture above.

Uranium from Canada

Mining the World's Largest Known Deposits

FOR some time the world has known that Canada is rich in that most valuable mineral of the atomic age—uranium. Just how rich, however, could only be guessed at until a comparatively short time ago, when the first detailed information was released on the immense deposits in Ontario's Blind River region. It is generally accepted that this region contains the world's largest known source of uranium.

Even the optimists were astounded then, as it became apparent that by the end of 1957 Canada would be producing more uranium than all other countries combined; that the largest uranium concentrator plant in the world was shortly to go into production at the Blind River mine of Consolidated Denison Limited; and that the uranium reserves of that mine alone were estimated at 135 million tons, more than twice the total known reserves of the U.S. Reserves of this mine are enough for 50 years, with operations yielding 10,000 tons a day.

The ore discoveries at Blind River, which is north of Lake Huron and about mid-way between Sudbury and Sault Ste. Marie, were made in 1953. Plans were immediately made to go into production, and a contract was given to the Perini Construction Company to build crushers, buildings, and the huge concentrator. The site of the mine is about 30 miles north of Spragge, Ontario, in rocky, scrub-bush terrain of bluffs and ravines that rise rapidly north of Quirke Lake to the mill site, 300 feet above the lake. Work began in November 1955. After clearing ground and building roads, camp buildings, service buildings and crusher houses, a start was made on the huge concentrator mill.

There are two large shafts in the mine, one 1,860 feet deep and the other 2,700 feet. Spoil from these shaft-sinking operations helped to solve a major problem for the Perini Company, which was having trouble finding coarse aggregate for making concrete. The problem was solved by crushing material from the shafts.

The picture at the head of the page shows the world's largest uranium ore concentrator plant. It is at Quirke Lake, Ontario, Canada, and has been built by Consolidated Denison Ltd., which owns a production uranium mine in the area. Canada's position as the largest producer of uranium in the world has been greatly strengthened by the development of mines in the Blind River region of Canada, north of Lake Huron, of which the Quirke Lake mine is an example.

During plant operations, ore from the shafts will be delivered to the primary and secondary crushing plants, and the fine ore will then be pumped to the mill, 2,500 feet away, for reduction to uranium oxide, a yellowish powder that is the basic material of atomic energy.

When the plant is in full production, the rich deposits beneath the ground will be mined and processed at the rate of 6,000 tons a day, a higher rate of production than any other uranium concentrator plant in the world. The plant was designed to permit expansion to 10,000 tons a day.

Denison's ore zone is a three-layered slab, dipping flatly to the south and extending under Quirke Lake. The upper layer or reef has shown values of from five to six pounds of uranium oxide per ton. The middle reef is intermediate quartzite of lower values, yielding about 1.5 to 2 pounds per ton, which is considered a good grade for large tonnage operations. But the bottom reef is the one that offers the most exciting yields. This reef is from 4.5 to 5 feet thick, and its uranium content has been found to range from 14 to 23 lb. of uranium oxide per ton.

Because of the thickness of the ore and the relatively flat dip, the company is using trackless mining. In this method, underground development follows a herringbone pattern, with drifts fanning off from a central incline running down through ore for about 2,500 feet. Electric and diesel shuttle cars, with 15-ton capacities, will carry ore from the various working faces out to a conveyor belt in the central incline.

Uranium produced in Canada is sold to the Crown-owned Eldorado Mining and Refining Limited. Much of Canada's production eventually goes to the United States, which at present produces only one-third of its requirements within its own borders.

The Blind River region is becoming an area of increasing significance on the Canadian map. There, Pronto Uranium Mines started processing ore in 1956. Two other uranium mines, with a combined production of 6,000 tons a day, were recently put into operation by Algom Uranium Mines Limited. Across Quirke Lake, Can-Met Explorations Limited, a company associated with Denisons, is also pushing towards production. Ore reserves there are in excess of 15 million tons, and two shafts are being sunk. In a year or so it is expected that 12 mines will be in production in the area.

To serve the population a town called Elliot Lake has been built halfway between Spragge and Quirke Lake. The model town was developed by the Department of Planning and Development of Ontario. All sorts of figures have been mentioned for future population, but a reasonable figure would probably be 12,000 in the next five years.

Moving heavy equipment and supplies in from the railway at Spragge to Quirke Lake was no small problem either for the Perini Company, or for Edwards Sudbury Limited, who supplied and delivered Shell petroleum products for the work. The road was an old logging road, widened here and there to allow vehicles to pass, and winding through wild, rocky country. Two hills were so bad that the Department of Highways stationed heavy, winch-equipped machinery at the top to help pull the

(Continued on page 110)

An aerial view taken during the construction of a shaft at the Quirke Lake uranium mine.

Snowfall in Britain

By David Bowen, F.R.Met.S.

IN 1869 Scotland and the northern counties of England experienced fierce blizzards within ten days of Midsummer, while between 9th and 12th of July in 1888 snowfalls were widespread throughout the whole of Britain. But today, however unseasonable the weather, we do not expect snow later than in May or before September.

This, although perhaps a sad admission, is not too high a price to pay for having our worst bouts of winter confined to the periods between December and March and frequently to only January or February.

For Southern England there is an average of only about two days of snow or sleet in December, but nearer twice this number in each of the other winter months. Travelling northward, the frequency increases in much the same ratio. Balmoral expects eight days of snow or sleet in December, nine in January, eight in February and ten in March. These averages are naturally more useful for purposes of comparison than for giving an indication of what to expect in any one year. The most significant feature of British snowfall indeed is its ability to vary in quantity, location and time of arrival from one year to another.

A Kentish snow scene. This county, in spite of its southern position, is liable to heavy snowfalls because of its continental position and fairly high ground. Photograph by courtesy of the R.A.C.

Over a 25-year period the regions of heaviest snowfall are well marked. Falls are heavier in the Eastern Highlands of Scotland than farther west; and similarly, in England, the Eastern Pennines have more snow than other parts. These facts of course prove that altitude is no less important a factor in the production of snow than latitude, for temperature decreases with height. Above 3,000 feet on the Cairngorms, Ben Nevis, and other summits, even comparatively mild airstreams will be cooled sufficiently to produce snow if the correct amount of water vapour is present. And snowdrifts tend to linger in these regions throughout much of the summer.

To a lesser degree such effects may be noticed in towns like Huddersfield or the high-lying suburbs of Sheffield. But at all levels, exposed north-eastern districts are snowier than those in similar or even more northerly latitudes bordering the West Coast. The section of the Great North Road between Stamford and Grantham is only a few hundred feet above sea level, but it is notorious for its high snowfall during wintry weather. In 1708 Ralph Thoresby was forced to spend five days at Stamford due to deep snow. Towards the end of that century the drifts in the still flatter country near Cambridge were equally severe and imprisoned a certain Elizabeth Woodcock for eight days before she was discovered—miraculously—alive.

Along our western coasts the vagaries of snowfall are no less surprising. Prestwick, on the Scottish mainland—and, farther south, Morecambe Bay—are markedly snow-free, and so are the other coastal regions that are largely protected from easterly and northerly winds. But the

heights, notably Dartmoor, of the mild peninsula of South-west England are exposed to the cold wintry winds from the east and south-east, and there are times nearly every year when they suffer heavy falls. Drifts of exceptional depth also have been reported. In addition, transport in all the inland regions of the South-west from Devon to Wiltshire may be affected as seriously as it is in counties farther east, for many of the main roads and lanes are deeply entrenched.

Railway points and crossings being cleared of snow by compressed air at York. B.R. Official Photograph.

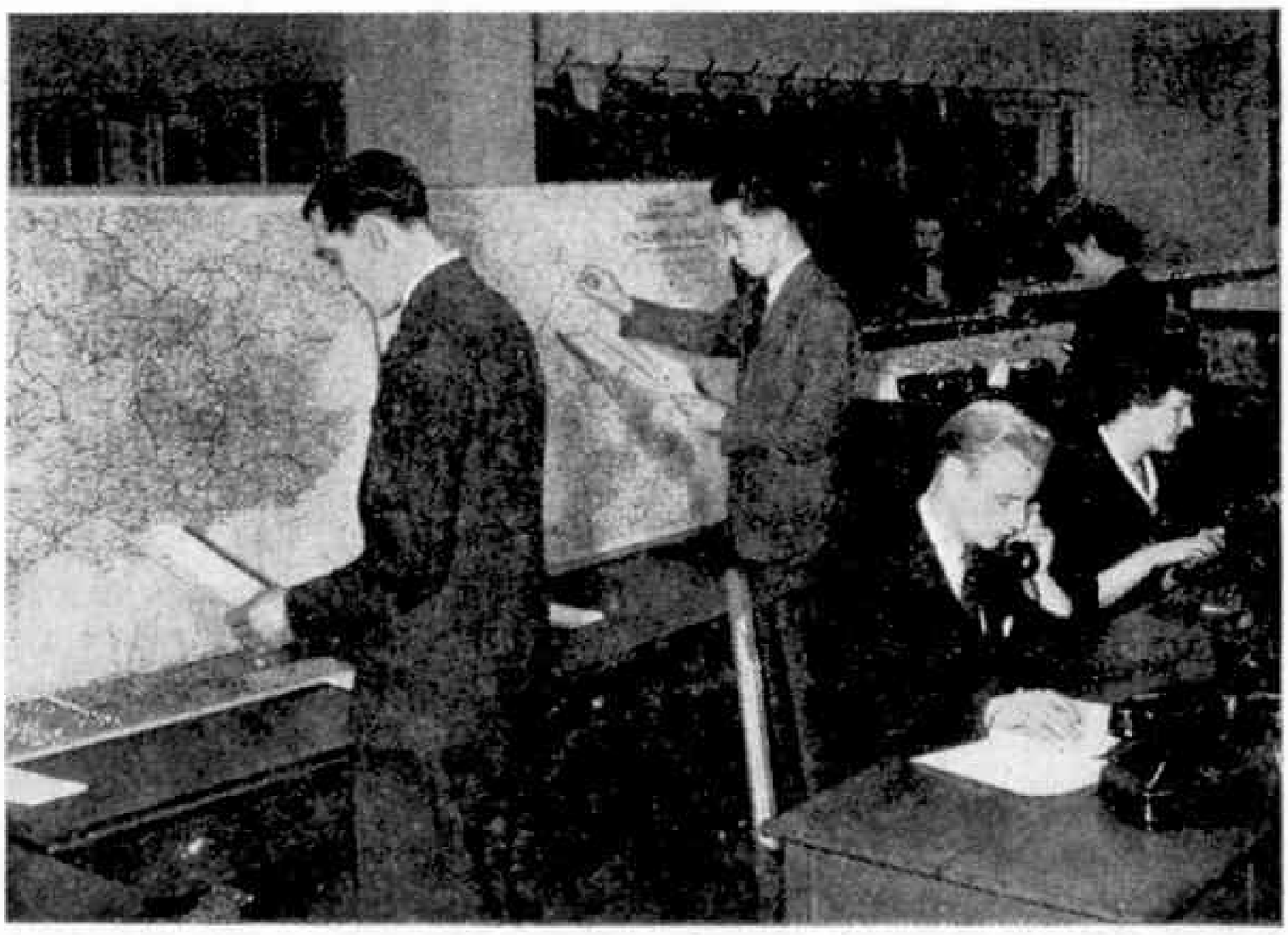
Those, therefore, who wish to visit the West Country "to avoid the winter" should make sure that they go to the mild areas. In the Scillies there is an average of only three to four days of snow or sleet-fall per year. South-west Ireland shares this record. The islands of Scotland, which are more exposed than the protected parts of the mainland to outbursts of polar air, have up to forty days per year. Ben Nevis has an average expectancy of one hundred and seventy days. These figures, however, are reduced very considerably, especially in the case of the Hebrides, when considering the number of days when snow is persistent and lies on the ground.

Whether it rains or snows is entirely a question of air temperature, not of the temperature of the ground, but whether the snow will lie or not depends on both these factors. Drifts, or the lack of them, are allied to wind strength but, again, not solely. Hilly or undulating country encourages the formation of drifts, particularly when the wind is more than moderate in strength, and the process is further aided by strong gusts, which in windy weather are accentuated over bumpy or hilly ground.

Finally, the depth of both level and drifted snow will be largely related to the air temperature during the fall. When the temperature is below or near freezing point, flakes tend to be of the small granular variety, but at around the level of 34-37 deg. they will be larger and stickier.

"It's too cold to snow" is a remark which many of us have heard. There is just a grain of truth in this—unlike that other saying "It's too windy to rain," which is completely false. For the colder the air happens to be, the less moisture it can contain, either as rain or snow. But in this country, we must remember that cold dry easterlies soon clash with milder Atlantic airs, and it is these that provide the moisture for our heaviest snows.

Those of us who spend much of our



Plotting road weather charts at R.A.C. headquarters. R.A.C. photograph.

working lives in large towns are inclined to forget the magnitude of the snowfall on high land. From London, especially, with its comparatively high artificial air temperature and its level, virtually drift-

Snow is always heaviest over high exposed ground. Here it is seen cut into parallel wind-drifts over Grisedale Pass, in the Lake District.

free roads, it requires more than just a jerk of the imagination to picture high altitude roads such as those that cross the Pennines from Durham to Cumberland, or from the Derbyshire Peak District to Cheshire. There snow posts fifteen feet high are used to indicate the roadway, and even these may become buried from time to time. In the worst affected northern and north-eastern regions, railway lines need to be protected at danger points. Even during the March and early April "lambing storms," when snow showers occur in a strong Arctic airstream, drifts in the exposed northern hills are a certainty.

But despite our abundant mountain snowfalls, and the fact that at 2,000-2,300 feet the snow-cover in Scotland compares favourably with the normal expectancy of lower Alpine resorts, conditions for ski-ing in Britain are comparatively poor. This is due to the alternation of damp winds and frosts, which create bumpy, dangerous surfaces. These, however, may be made temporarily safe again by the arrival of fresh snow.

Under present climatic conditions our mountains could not contain even small permanent glaciers unless they rose to well over 5,000 feet. But since about 1830 North European winters have become progressively warmer, and very rapidly so since the turn of the present century. Evidence from Scotland backs up the more spectacular observations from Norway, Iceland and Greenland, in that during the Septembers of 1933, 1935, 1938 and 1945, some of the semi-permanent snow-bed drifts on the north-east flanks of Ben Nevis and Braeriach completely disappeared. Another 50-year temperature rise at the same rate would mean a considerable reduction in snowfall in all parts of Britain but it would be safer if we could concentrate, instead, on the more probable event, which is the gradual return to less clement winters.

This, after all, has been the case after each of the seven major winter temperature rises since 1300. Another severe winter like that of 1947 would be little short of disastrous in present conditions in this country, and we should seriously consider in what ways we can begin to re-plan our economy to meet events of this nature.

Whatever we do, the enjoyment of snow will be strictly limited in this country; for nature, combined with industrial dirt, overcrowded roads and paths and the efforts of local councils, will soon convert it into the most appalling filth. Only in the wildest parts can it provide us with bright reflections, blue shadows and pure bracing airs.

Particularly annoying to many people, probably more so to farmers than to transport operators, are out-of-season snow storms that can ruin crops or cause lasting damage in the course of one or two days. It is useful to remember that these often coincide with the Buchan "Cold Periods" occurring between 11th–14th April and 9th–14th May.

There is another Buchan "Cold Period" in August, which in some years brings heavy hail showers, but so far no real snow.

Transport in Kenya

How the Railway reached Lake Victoria

By the Editor

RAILWAYS, which play a very important part in any country, can be particularly useful in opening up new lands. For this they are indeed almost essential, and there have been many instances in the past where the building of a railway has been a vital step towards the creation of new wealth by agriculture and by mining.

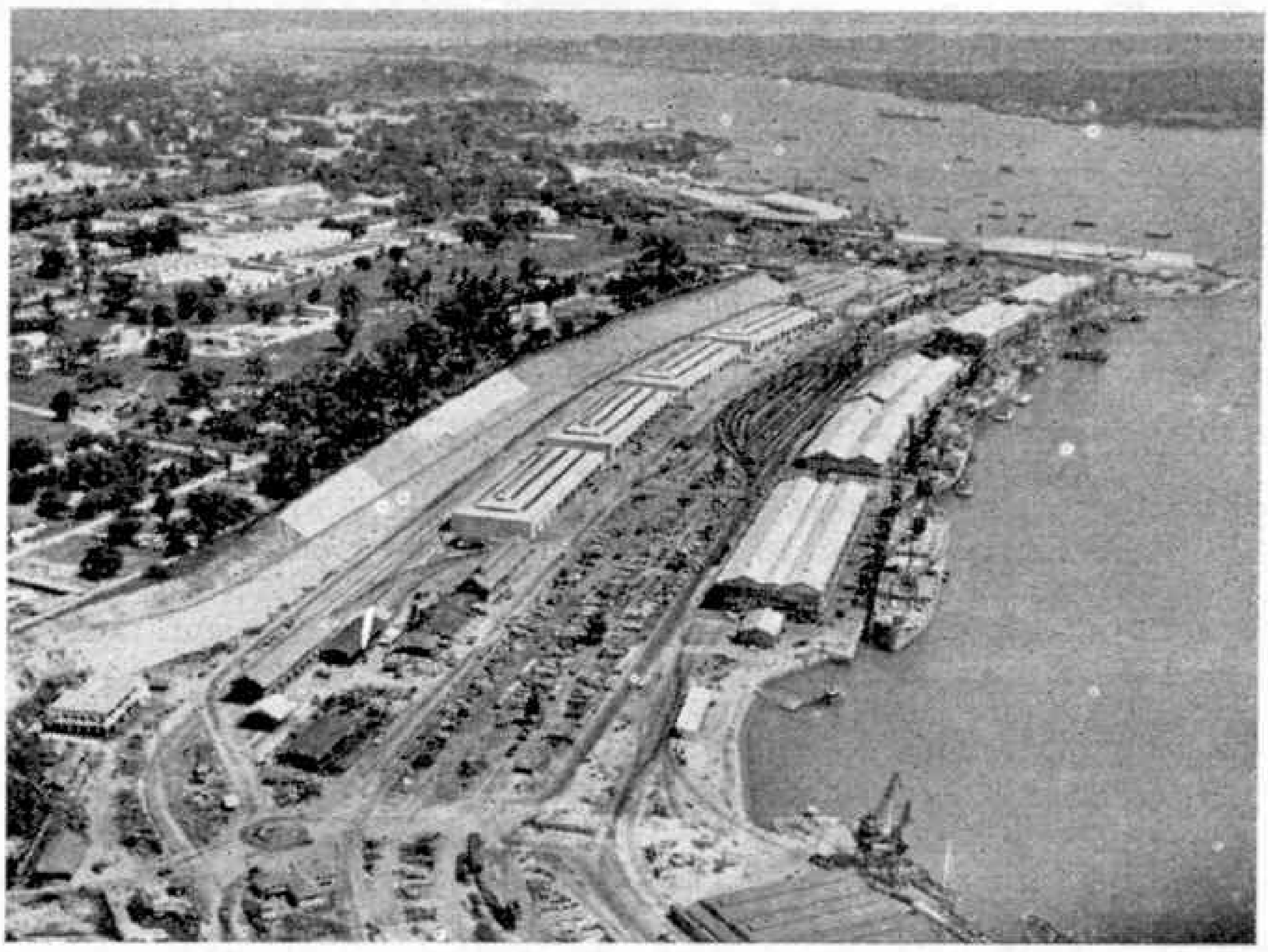
One excellent example of this use of railways was given in East Africa. Last century Arab caravans roamed this area, which is almost equal in size to the whole of Western Europe, bringing back to the coast with them slaves captured in the interior, to be sold and taken out of the country. This traffic continued for a long time, and about 1870 it was thought that as many as 18,000 slaves a year fell to the Arab traders.

Partly to stop this inhuman traffic, and partly also because of a desire to found colonies, Great Britain and Germany became interested and eventually an agreement was reached whereby the northern part of the country came under British influence and the southern part became German. The former area is what we now call Kenya, and the latter Tanganyika. After the first World War Tanganyika also came under British control, and today the two, with Uganda, make up British East Africa.

In the early days when the British and German spheres of influence were defined, it was realised that railways providing access to the interior would play a great part in bringing slave traffic to an end, so surveys began to be made for lines from the East African coast inland. The first railway in East Africa appears to have been one of 2 ft. 6 in. gauge built inland from Mombasa, the port of Kenya. But money to extend this was not forthcoming, and the line was abandoned.

Eventually, with British Government support, a railway was planned from Mombasa to Lake Victoria, the great inland sea, nearly as large as Scotland, the waters of which feed the Nile. The chief object in building this was rather to gain access to the fertile and populous country of Uganda, on the northern shores of the Lake, than to develop Kenya, which was then looked upon as a no-man's land that just had to be crossed.

Construction of the railway began in 1895, but all kinds of difficulties were met with. The country was practically unknown, inhospitable and at times unhealthy. The work had to be done by hand labour and since none could be found locally it had to be brought from India. This was the main origin of the present day Indian population in East Africa, where



Mombasa, the principal port of Kenya, seen from the air. The illustrations to this article are reproduced by courtesy of the East African Railways and Harbours Administration.

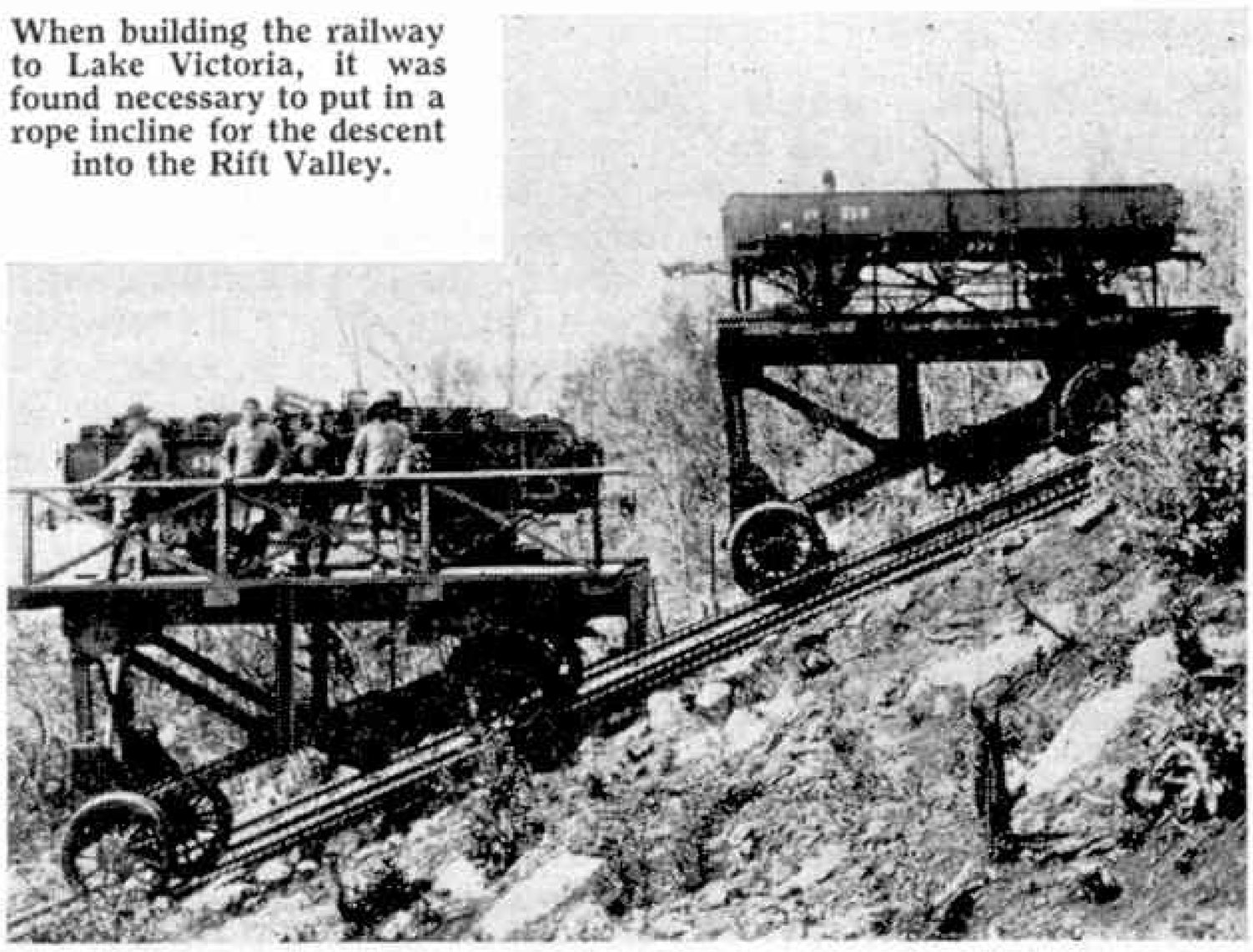
grandsons of some of the Indians who were brought over to build the line are now working for the East African Railways.

The first stretch of the line had to be built across the waterless Taru Desert. There was a gradual ascent afterwards, and farther on the line had to get over the great escarpment of the Rift Valley, the long narrow valley with steep sides that runs north and south through Kenya. This was a formidable obstacle, for the line had to climb to nearly 8,000 ft. to the top of the escarpment, drop then to 6,000 ft., and then climb again to nearly 9,000 ft.

During construction, droughts alternated with heavy rains that washed away the line or the earthworks. Materials and stores had to be carried by all kinds of animals, from donkeys to camels, in areas where there were no roads, and in the end steam traction engines came into use, with great success. Other enemies were lions, particularly near Tsavo, and indeed the man-eating lions of Tsavo have become famous. For a considerable time these fierce creatures terrorised the railway builders in the area, and indeed brought construction to a complete standstill for about three weeks at the end of 1898. They are said to have killed and eaten 28 Indian coolies and scores of Africans. One story tells of a lion that actually got into a railway compartment and carried off the then Superintendent of Railway Police, although there were two other men in the compartment with him.

Altogether construction must have been a very tough job and it is no wonder that work was not very rapid. The first supply of stores for building the railway arrived in May 1896 and three years later the railway reached the site of Nairobi, 330 miles away. Railway headquarters were established there, and Nairobi has since become the capital of Kenya and its first city.

Then came the extension westward towards Lake Victoria. From the engineering point of view this was very difficult indeed, chiefly because it was in this section that the Rift Valley had to be crossed. The gradients there were so steep that a rope incline had to be put in to speed up construction. But progress was made, in spite of many mishaps and troubles of all kinds, and the shores of the Lake were reached in December 1901 at what was then called Port Florence, but is now to be seen on maps with the name of Kisumu.



When building the railway to Lake Victoria, it was found necessary to put in a rope incline for the descent into the Rift Valley.

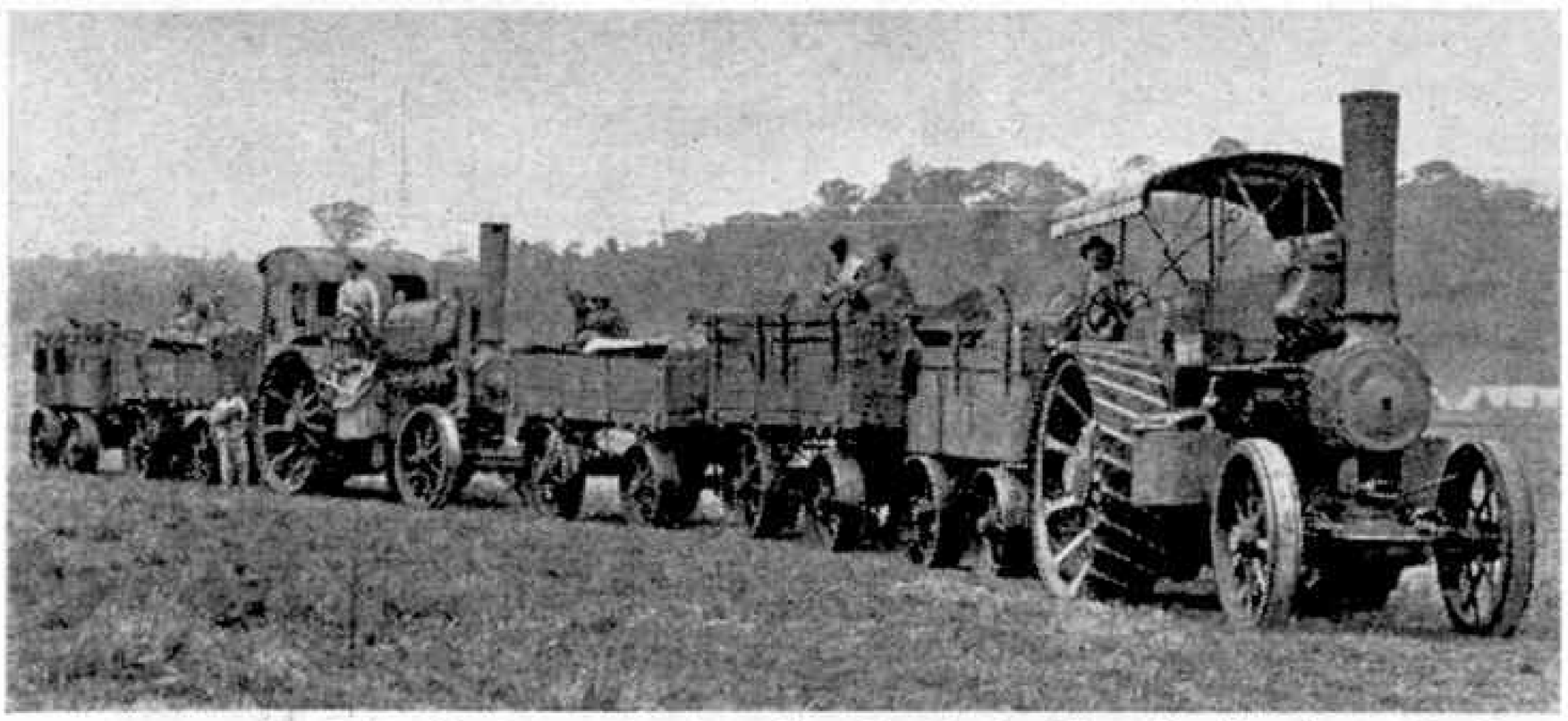
It had taken 5½ years to build 582 miles of railway, at a cost of £5½ million. Even then Uganda had not been reached by rail, but two steamers were launched on Lake Victoria, and these maintained communication between the railhead and Uganda. One of the three earliest steamers, the *Sybil*, is still in use, as are three Lake Victoria steamers that began work between 1907 and 1914.

In the meantime, in Tanganyika the Germans were also building their railways westward, one in the north of the territory and the other farther south. Construction proceeded very slowly, and the lines were not only built to very low standards, but also passed through intermediate areas that were not the most suitable for agricultural and other developments. It seemed that the Germans were more intent on reaching Lake Victoria quickly than on providing a permanent and thoroughly reliable system.

In both Kenya and Tanganyika the cost of the railways built was much higher than had been expected, and it was only natural to look to the lands over which they ran to provide revenue. The Germans established plantations of rubber, cotton and coconuts, and they brought sisal to East Africa. The British were quick

to learn from this and also started growing sisal, together with many other crops that have been thoroughly developed, including tea and coffee, while the discovery was made that Uganda was a good place for growing cotton, with the result that cotton production expanded rapidly and in 1954 no less than 70,000 tons of cotton were exported from the country.

Naturally this led to a period of prosperity, particularly after the end of the first World War. From 1918 to 1929 indeed everything seemed to be expanding. Trade was developing and the railways and harbours were having to develop with it. During this period direct railway communication with Uganda was established by extending the line to Kampala. crossing the Nile at Jinja, where today there is a great hydro-electric power station, and many branch lines to assist in general agricultural development were built.



Unusual transport for railway constructors. Supplies for building the line from Mombasa to Nairobi were brought up by traction engine.

Then a great trade depression put an end to further progress. Some recovery was made before the second World War, but it was not until the end of that war that prosperity returned. This has brought with it a new era in railway building, although no new lines have been built in Kenya and it scarcely seems likely that there will be any further construction, if only because of the great extension of Kenya's road system. But there has been an important railway development in the building of a line in Uganda from Kampala to the Mountains of the Moon, the chief purpose of which is to give access to valuable copper mines in the west of the country. This line is about 208 miles long, and an account of its construction appeared in the *M.M.* for August 1956.

While the railway was spreading across Kenya and Uganda, and similar progress was being made in Tanganyika, the ports of the country too had to be improved and extended, with the construction of new quays and the provision of cranes and storage sheds, etc. All this work has been carried out in conjunction with the extension of railways, and today the whole of this great transport system is under the control of the East African Railways and Harbours Administration, which also runs pretty extensive lorry and bus services. To do this it operates just over 3,400 miles of railway, 5 principal sea ports, inland water services covering 6,300 miles of route and lorry and bus services covering nearly 2,300 miles of route.

For the railway it has about 430 locomotives, nearly 1,000 carriages and over 9,000 wagons. For the inland waterways it has 10 steamers, 8 tugs and more than 80 lighters, and for the road services over 200 lorries and buses. At the ports it has now deep water quays—those to which ocean going ships can tie up—amounting in total to nearly a mile and a half in length (including the new quays at Dar es Salaam that Princess Margaret declared open on the 8th October, 1956), with other quays for shallow draft craft which are in total nearly a mile long. Last year nearly 3,000 ships entered East African ports and those ports handled more than 2½ million long tons of cargo of all sorts.

The East African Railways and Harbours are in fact the largest single industrial organisation in East Africa. They employ over 63,000 staff, whose pay costs more than £7 million a year. Of these only about 1,600 are Europeans.

On its railway, road and inland waterway services more than 5½ million passengers and nearly 4 million tons of public goods were carried last year. From these services nearly £21½ million were earned, and expenditure was nearly £20 million. This income and expenditure was nearly as great as those of the Kenya Government, and more than those of Tanganyika or Uganda.

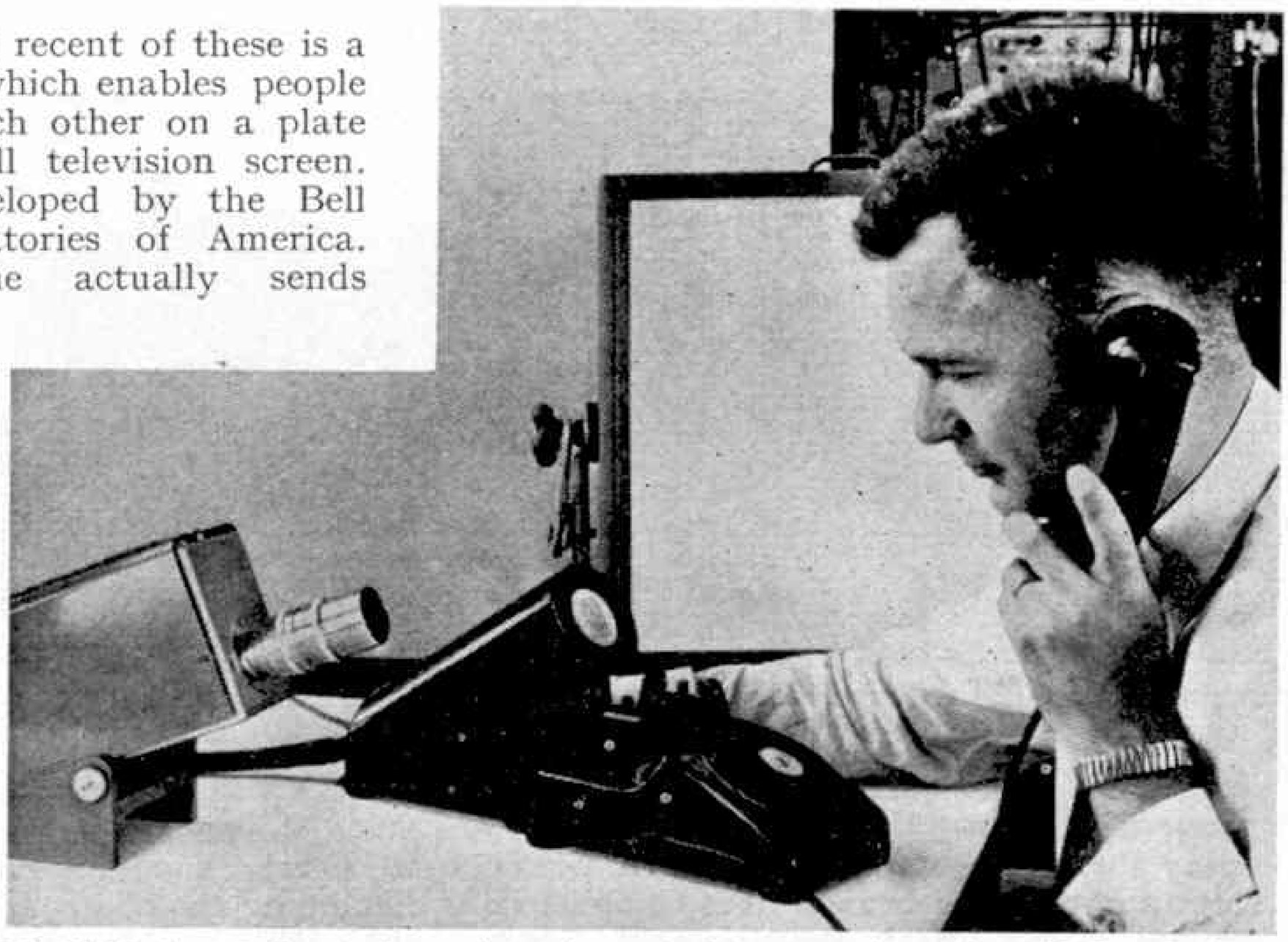
New Uses for Telephones

How the Service may yet be a Blessing

By A. J. Branston

SCIENTIFIC ingenuity, always seeking to make life more complicated, now threatens to adapt the telephone for a variety of new uses that may please or horrify you, depending on whether you look upon the phone as a curse or a blessing.

One of the most recent of these is a "picture-phone," which enables people using it to see each other on a plate similar to a small television screen. It has been developed by the Bell Telephone Laboratories of America. The picture-phone actually sends images of the callers, at the rate of two pictures per second, over the regular telephone system. A relatively simple camera and a small screen two-by-three inches, as well as the actual telephone instrument, complete the equipment of this extraordinary invention. If the caller doesn't want to be seen—and a wife with hair straggling like a storm-tossed hayrick, or a husband whose unshaven bristles give him a convict-like air, may well NOT wish to be seen!—all he or she has to do is to put a switch into its "off" position—and keep it there during the conversation!



A Bell Telephone Laboratories engineer demonstrates an experimental model of a telephone that transmits pictures of the speakers as well as their voices. The miniature television camera is on the left, and the receiver is attached to the telephone. This addition of picture transmission will require only one more ordinary telephone line to the user's premises.

At present the device is likely to be used only by business concerns, hospitals, and important governmental departments. Doctors and perhaps dentists will find it useful, no doubt, but we can also imagine other uses that might be made of it when it became universal, for instance millions of housewives gleefully phoning up their rivals to display a new hat or other fashionable acquisition!

When indeed we recall that there are roughly 100,000,000 telephones in the world, and that this number is increasing daily at an amazing rate, the mind boggles at the possibilities that this one invention alone conjures up. The more progressive a country, the greater the number of telephones per hundred of population—and the greater these possibilities for good or bad are. The United States, for instance, has something around 55 million phones, Britain about 7 million, Canada 4 million, and New Zealand around 550,000.

Another telephonic development that promises to be of real service to man is a new kind of phone emergency system now being perfected in Belgium. Under this system the number from every public emergency call will appear automatically on a screen at police headquarters, thus saving time when time is vital. If the system works successfully, it is expected to be in full use in Brussels, and possibly

in other European cities, by 1960.

The idea of having a portable multi-coin box for the use of sick people in hospitals, which is now under trial in a London hospital, is indeed a good one. By simply plugging the telephone into a wall point beside the bed, a patient who is well enough is able to talk directly to a relative or friend. This is a warming thought for those who on making enquiries have normally to be satisfied with a brief report to the effect that the patient is "comfortable."

Just as useful psychologically are some of the novel telephonic services already being offered in different parts of the world. How much better we would all feel if we could start off each day, especially Mondays, by hearing a telephone caller telling us a joke that makes us split our sides! This "tell-a-joke" service is available in several European cities, having been initiated by the postal authorities in Hamburg. A bright medical student of Amsterdam improved the idea by recording a selection of jokes and offering the joke-a-day service to leading hotels for the benefit of their guests—for a fee, of course.

Demonstrating the Picture-phone in use. The engineers of the Bell Laboratories expect to be able to reduce the television unit size and to make the system commercially feasible.

Other services that enterprising city authorities are offering through the telephone include giving the latest football results, exchange rates, entertainment programmes and transport timetables, rather like Britain's TIM for getting the time, WEA for a weather forecast and seasonal additions such as phoning a London number to learn the latest Test Match score.

To services such as these, the German cities of Dusseldorf, Hamburg, Cologne, Kiel, Coblenz, Munster and Lubeck have added another most useful and intriguing item. By dialling a certain number a caller may hear a 3-minute news bulletin, giving highlights of the latest news. In Bonn and Cologne also, callers can get new recipes for cooking, weather forecasts, and the names of available doctors and chemists, just by dialling the appropriate number. Stuttgart inhabitants enjoy another enthralling phone facility—a variety of fairy tales for parents whose own stock is exhausted!

An "automatic-answer" telephone is yet another device that has been receiving the skilled attention of research workers for some years now. One of the latest of these uses what is called a "talking rubber," made of a rubber-like plastic and iron oxide, which is used to record messages. If you owned one of these, and wished to leave a message for callers, you would dictate that message on to the "talking rubber," and switch the machine to "automatic answer." The moment the phone bell rings, in your absence, the machine starts up and the caller hears your voice saying who you are and asking his name and telephone number. And the machine also records what the caller has to say. On your return you simply play back all the calls that have come in, and as often as you please. The "talking rubber" can be used over and over again endlessly.

Clearly, this device can be safely labelled a blessing, for it will enable people to be absent from home even on those occasions when they are expecting an important call, and yet have a still more urgent reason for going out.

The End of an Era

Last Days of Liverpool Tramways

By J. W. Gahan

ON Saturday, 14th September, 1957, at 5.30 p.m., the tramcars of Liverpool began their last journeys from the Pier Head, watched by thousands of people who lined the route from there by way of Edge Lane to Bowring Park.

There were thirteen tramcars in this ceremonial ending, all of the 4 wheeled "Baby Grand" type, and they formed a procession, carrying interested members of the public, and retired and present employees, while City officials travelled at the rear of the parade in a special cream painted car number 293, which is seen in the picture on this page.

With the closing of the tramways, it will be of interest to briefly review the story of passenger transport in Liverpool, which is a long and fascinating one. A large and growing centre, Liverpool felt the need for efficient passenger services very many years ago. As far back as 1861 a tramway was laid in the district of Fairfield, from Shiel Road to Old Swan. But this was later removed, as the type of rail in use caused difficulties, and the tramway system had its real beginnings in 1869.

The tramcars were drawn by horses in those early days, although experiments were made with other forms of traction. Various kinds of rails also were tried, and those used in the later days of the horse-drawn system had the groove in the centre, unlike the present-day rail, which has an inside groove for the flanges of the wheels and the running surface alongside. The wheels of the cars of course had the flange on the centre of the tread, and it is of interest to note that a relic of this era survives today in the form of a length of centre-groove track in Great Charlotte Street, in the city centre.

Tramcar No. 293, Liverpool's last tramcar, shown in the special cream livery in which it ran during the final week of operation. Photograph by J. Horne.

Both tram and bus services were operated by companies in the early days, the detailed history of which is rather complicated and cannot be dealt with in this short article. In the year 1897 the Liverpool Corporation took over the whole of the tram and omnibus services, and began to electrify the tramways almost immediately. This work was carried out rapidly and was completed by 1900.

The first route to be electrified, in 1898, was that between St. George's Church in South Castle Street, and Dingle, at the south end of the city, and to operate this route, single deck, single truck trams with trailers were brought from Germany. These were followed by long single-deck cars with centre entrance and what were called Maximum-Traction bogies. They came from the United States and were known as the "Philadelphia" Cars, but were based on the type used in Cleveland at that time.

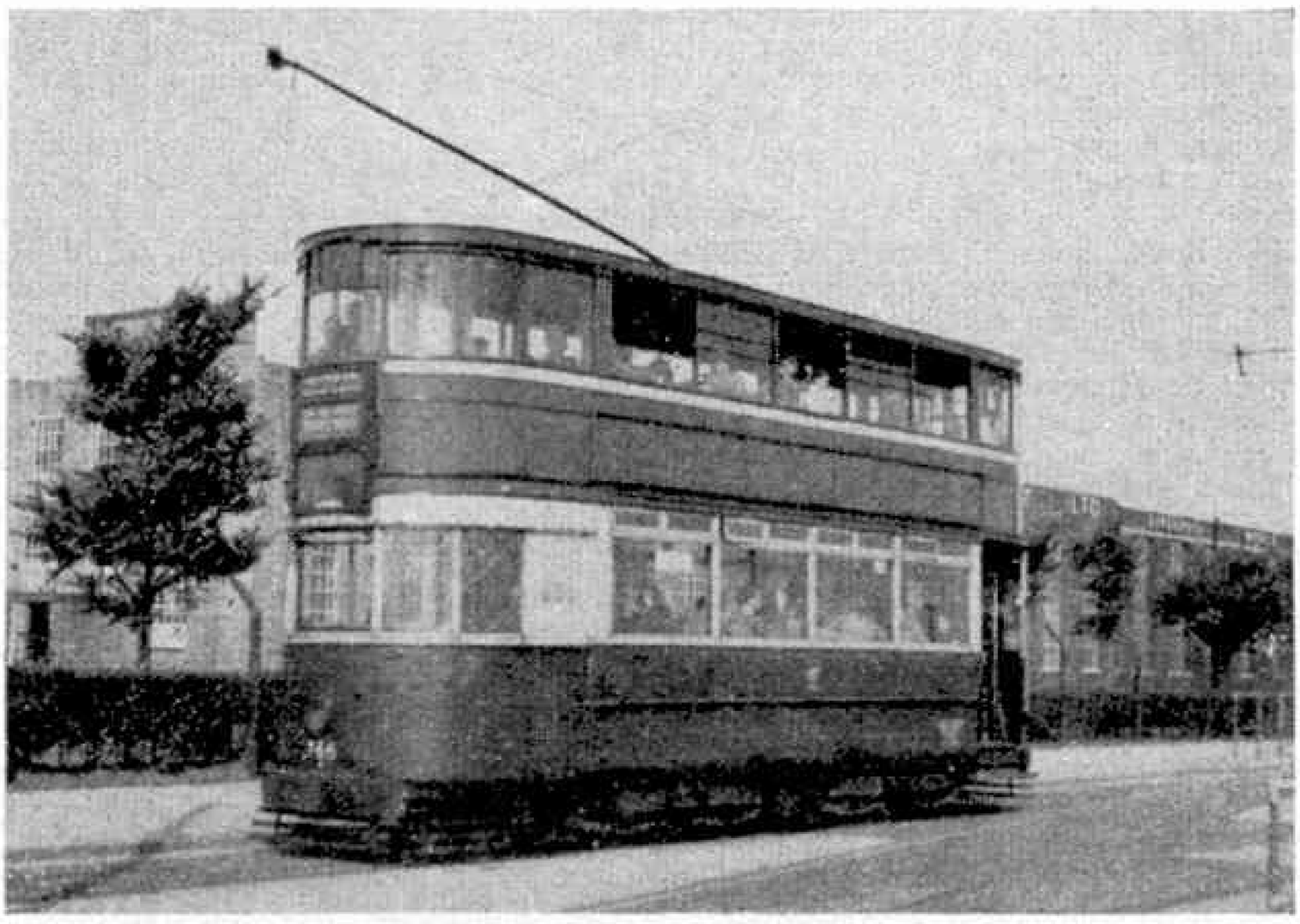
The tramways were gradually developed up to the time of the first World War, and in 1914, the year in which it began, the

first of the famous Liverpool reserved tracks was opened between Old Swan and Bowring Park. Reserved tracks were later the most notable feature of the Liverpool tramway system.

New and improved four-wheeled trams were added to the fleet, at first with open top decks, followed by enclosed vehicles that were open at the ends on both decks. An experimental type of bogie car seating 83 passengers also was produced, but this type was not perpetuated. After the war ended a new series of cars was built with platforms unscreened and with open balconies on the upper decks that were covered over. These became known as "Bird-cages," a title inspired by the wire protection screens round the ends.

In 1925 came the first of the "Standard" Cars, of which there were several different types, some varying only in minor details. These had totally enclosed upper decks, but the lower deck platforms were still open. The majority of these received windscreens in later years, and later batches were built fully enclosed. Some were later fitted with high speed motors, and many had new trucks and air brakes fitted shortly before the 1939-45 war.

In 1928 the old ex-Company carriage works at Lambeth Road were found to be inadequate to serve the expanding system and were closed. A large and well-equipped works in Edge Lane replaced them. Further new trams were added, and it was then that the first steps in modernisation of the tramcar fleet were taken.



Tramcar No. 766, an English Electric car on E.M.B. lightweight trucks. Photograph by S. Clarkson.

In 1929 a long single-deck experimental car was built with a view to operation in the Mersey Tunnel. This vehicle was known as the "Ghost Train" because of its quiet running. It remained the only one, as the tunnel tramway scheme was dropped.

This car was followed by a batch of eight-wheeled double deck vehicles that had bogies with inside frames, the exposed wheels being partly hidden by a hinged valence. Some of these particular cars were later placed on E.M.B. Lightweight trucks and speeded up. In 1932 came a further design of bogie cars which were painted green and cream. These cars were christened "Green Goddesses" by the public, a name which was applied to all future trams in the green livery, but not of course to older cars that eventually were repainted in this livery. Red and cream had been the colour scheme used previously. Two more bogie types, with domed roofs, were produced, and in 1936 came the well known "Streamliners." These were high speed cars and three different types of bogies were used, namely E.M.B. Lightweight, E.M.B. Heavy, and some of Maley-Taunton design. These trams could carry 84 passengers.

The final design came in 1937 in the form of a smaller edition of the "Streamliner" on a four-wheel E.M.B. Flexible Axle truck. They were built to carry 80 passengers and were known as "Baby Grands."

The "Streamliners" and the "Baby Grands" were a complete departure from the conventional design of British tramcar. The four-wheelers were the last to remain in service in Liverpool. Many of the bogie trams found their way to Glasgow and are still in service there, with modifications.

In the late "Thirties" and during the war reserved tramway tracks were laid in the form of light railways well out into the suburbs, mostly in the centre of dual roads, and these roads with their tramways were the envy of many other towns. They were an excellent example of good planning, whereby the heavy passenger load was

(*Continued on page 110*)

The first of the Boeing Model 707 civil jet transports being prepared for flight.

Air News

By John W. R. Taylor

First of the Big Jet-Liners

One of my favourite stories of American life is of the Englishman who went into a drug store and asked for a small tube of toothpaste. He was told "Bud, our toothpaste is sold only in large toobs, giant toobs and super toobs. So if you wanna small one ask for the large size."

I was reminded of this by the news that the first of Boeing's fine new Model 707 jet-liners had made its first flight successfully on 20th December last, because it is one of the smallest of the new generation of U.S. jet air liners and yet will carry no fewer than 129 passengers in tourist-class seating.

This particular aircraft, illustrated above, is one of three Model 707–120's that will be put through an intensive flight test programme to try and get a certificate of airworthiness for the type by the late summer of this year. It is powered by four 12,000 lb. thrust Pratt and Whitney JT3C–6 turbojets and is intended for use on medium-length routes.

Later will come its big brothers, the 707–320 with four 15,500 lb. Pratt and Whitney JT4A–3 engines and the 707–420, of which 15 have been ordered by B.O.A.C., with 16,500 lb. Rolls-Royce Conways. These two giants will have a wing span of 142 ft. 5 in. and loaded weight of nearly 132 tons, and will carry up to 150 tourist passengers on intercontinental routes at an average cruising speed of 585–600 m.p.h. Perhaps the best idea of their size is given by the fact that the fuel carried in their tanks on a transatlantic flight will weigh more than a fully-loaded DC–7C air liner carrying 95 passengers.

Cheaper Pilot Training

Good news for boys who would like to be pilots of jet air liners one day is that a company has been formed in London to help young men to find the money needed to train as commercial pilots. Known as General Air Training Ltd., this company will arrange loans for suitable pupils, to cover the entire cost of training to Commercial Pilot's Licence standard with Instrument rating, including accommodation and board during the 12-month course.

Normally, help will be given only to men who have already obtained a Private Pilot's Licence and have been accepted as a potential employee by a commercial airline. General Air Training will then arrange a loan of £2,842 12s. to cover the cost of training at Air Service Training Ltd., Britain's "University of the Air" at Hamble, near Southampton.

Of this amount, £1,600 will be repaid on completion of the course by the airline which selected the pupil. The rest will be repaid by the pupil himself in 36 monthly instalments of £34 10s. 4d. This may sound a lot, but his starting salary as an airline co-pilot would be about £1,000 a year.

Intended to help solve the serious shortage of airline pilots by enabling any suitable boy to take the costly flying course, the scheme also covers training of helicopter pilots.

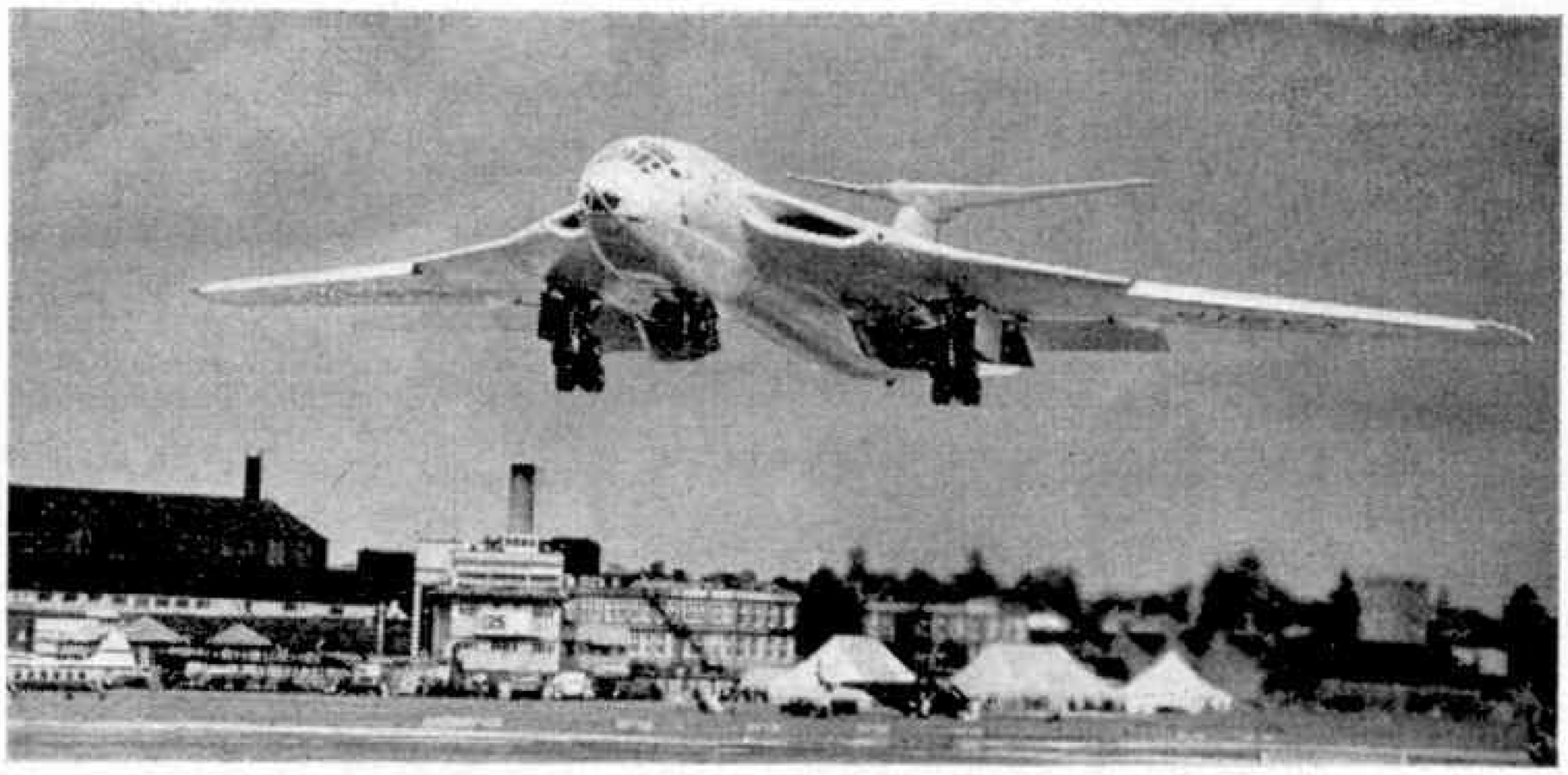
German Gannet

The unfamiliar markings on the Fairey Gannet aircraft illustrated at the foot of this page are those of West Germany's Naval Air Arm. This particular machine is a Gannet T.Mk.5 dual-control trainer and has no under-fuselage retractable radar "dustbin." It will be followed by 15 fully-operational anti-submarine Gannets before the spring of this year, earning a total of over £2½ million for Britain's export drive.

Helicopters Save Cherries

Answering an urgent S.O.S. from cherry growers in California's Central Valley, the U.S. Army authorised use of 15 Hiller H–23 Raven helicopters to whirl over the orchards, using the downwash

A Fairey Gannet T.Mk.5 in service with West Germany's Naval Air Arm as a dual-control training aircraft.



Handley Page Victors are now in service with Bomber Command, R.A.F. Here is a picture of one of these big, crescent-wing bombers. Shell photograph.

from the rotors to blow off rainwater that would have caused the cherries to burst when the sun came out. The job was too big to be tackled by the few civilian helicopter operators in the district, and the prompt action of the Army saved at least half the crop, worth nearly £1 million.

Victors in Service

Deliveries of the Handley Page Victor crescent-wing bomber to the Royal Air Force began in the autumn of 1957. Fastest, highest-flying and most formidable bombers in the world, the Victors are being used initially by an Operational Conversion Unit at Gaydon, in Warwickshire. They are B.Mk.1 aircraft, each powered by four Armstrong Siddeley Sapphire turbojets and said to be capable of exceeding the speed of sound in a dive. Later will come the Victor B.Mk.2 with four 17,250 lb. thrust Rolls-Royce Conway turbojets.

£2,000 Saved in 7½ Minutes.

When the U.S.A.F. wanted to instal a 1,250 lb. mounting for a weather radar scanner on top of an 88 ft. tower near their Wethersfield base in Essex, they discovered that there was no equipment available in England to do the job. To have brought suitable equipment over from America would have cost nearly £2,000 and caused a two-month delay.

Instead, they sent for Captain Edward Hook and five of his men from the 23rd Helicopter Squadron based at Wethersfield. After sizing up the job, these men simply hoisted the scanner mounting into the air on the end of a cable slung from the winch of one of their Vertol H-21B Work Horse helicopters and lowered it carefully into position on the tower. The whole operation took just 7½ minutes, emphasising again the value of helicopters as "flying cranes."

Swedish Missiles

The lower picture on this page is the first to show the new Swedish-designed Type 304 air-to-surface guided missile, two of which can be carried under the wings of a Saab-32 Lansen two-seat all-weather fighter. Developed by the Swedish Guided Weapons Bureau (Robotbyran), in collaboration with other government and private organisations, the Type 304 is in production and is undergoing intensive trials before entering squadron service. Being rocket-powered, it can be launched against ship or shore targets outside the range of anti-aircraft defences, and offers much greater accuracy than conventional bombs.

Details of another new Swedish weapon, the Type 315 surface-to-surface bombardment missile, were announced at the same time. Intended for firing from naval destroyers, the Type 315 is launched with the help of four built-in booster rockets and has a special type of jet-engine for cruising to its target. Its guidance system functions equally well by day or night in all weathers.

This Saab-32 Lansen fighter aircraft is carrying two of the new Swedish-developed Type 304 air-to-surface guided missiles.

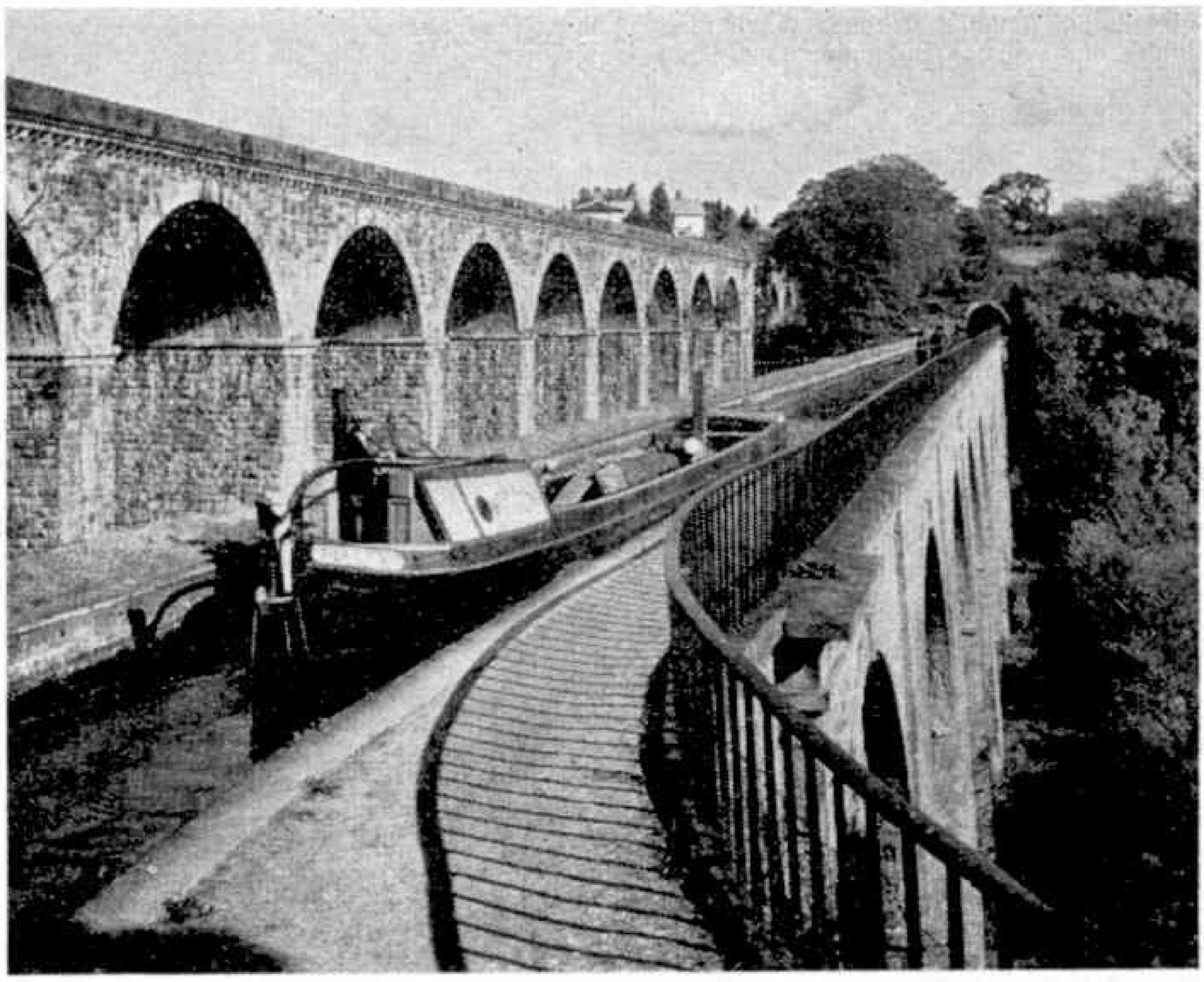
Regular Services for Animals

On 22nd November last, Skyways opened what are believed to be the first regular scheduled air services for animals anywhere in the World. Operated with specially-modified York freighters between Stansted Airport, Essex, and Beauvais Airport, near Paris, at a timetable frequency of one to seven return flights each week, the services are intended mainly to carry racehorses between Britain and the Continent; but every kind of animal will be welcomed except, perhaps, the giraffe, whose neck just isn't made to go inside an aircraft cabin!

First to use the Skyways "animal specials" were 30 horses belonging to Aly Khan, the average load being six or seven horses in special boxes, complete with fodder and comfortable seats for any grooms, trainers or other persons travelling with them.

* * * *

A good idea of the size of the U.S.A.F. is given by the fact that, on average, it has 1,150 aircraft airborne all over the world at any moment of the day or night.



Canal Cruising

By the Editor

A VERY pleasant way of spending a holiday that is becoming increasingly popular nowadays is to cruise along one of our inland waterways. Our canals were built to serve our industries, and in their heyday provided the principal means of traffic from one end of the country to the other. They still carry quite a large amount of traffic, nearly 10½ million tons being carried during 1955. But there are 2,170 miles of them, and they are certainly not overcrowded. So there is plenty of room for the pleasure seeker pursuing his leisurely way along them.

Chirk Aqueduct, seen in the picture at the head of the page, on the Llangollen Canal, leads into a tunnel. It was built by the pioneer engineer Thomas Telford, and is an outstanding example of his work. On the left of the illustration is the viaduct carrying the Western Region line from Wolverhampton and Shrewsbury, to Chester, a structure of much later date than Telford's Aqueduct.

British Waterways are today under the control of the British Transport Commission. About half the total are natural rivers and broad navigations able to take vessels with a capacity of from 50 to 400 tons. The rest are mainly narrow canals through which only the traditional "narrow boat" with a cargo capacity of 25 to 30 tons operates, and others that are unused, or kept open for special reasons.

That is the broad picture of the canal system today. The Commission encourages the use of waters under its control for cruising, as is shown by two fine booklets, the first of a promised series, that it has issued, each dealing with a particular stretch of canal. As guides to holidaymakers by water, and to those who are able to enjoy a leisurely trip through the English countryside, these are admirable. Each gives brief details of the history of the stretch of canal concerned, and then with the aid of a continuous line diagram takes its reader along the entire length of the waterway, marking navigational features, bridges and locks, and interesting scenes and buildings by the way.

The first of these booklets deals with the Llangollen Canal, one of those kept in working order for purposes other than navigation. It is of outstanding interest because its planning and construction were

The Llangollen Canal at Wrenbury.

the work of Thomas Telford, one of the greatest figures in British engineering history. Apart from that, it is perhaps the most delightful of waterways for the holidaymaker, for it starts in the mid-Cheshire plain and ends amid the Welsh mountains far up the Valley of the Dee above Llangollen. It bears evidence throughout of the skill and thoroughness of its creator in its many bridges and tunnels, and particularly in the famous aqueducts at Chirk and Pontycysyllte, in the Dee Valley, outstanding works that have often been described and illustrated.

The second cruising booklet is concerned with the Trent Waterway. This canal is still in commercial use, but is none the less attractive to canal cruisers. In general it follows the line of the Trent River from Wildon Ferry, in Derbyshire, to Gainsborough, and in part is actually formed by the Trent itself, suitably widened and deepened. It leads through country that is attractive and historical, and there are stretches that provide ample opportunity for sailing.

Those cruising on the Trent Waterway can not only enjoy the trip through the countryside, with its many interesting features and historical reminders, but can also gather some idea of what the canals mean to the country. For instance, they will find that Nottingham is an important centre for freight traffic. Goods arrive there from Hull mainly in 100 ton loads, for distribution by road over a wide area, and there are petrol and oil depots too, at Colwick, just below Nottingham, which are served by the waterway.

Each booklet is well illustrated with photographs and a map, in addition to the line diagram already mentioned. Sections also are devoted to navigational instructions for pleasure craft users, all of them simple and easy to follow, and special attention is paid to the operation of locks, for which full instructions are given. So the booklets provide attractive reading while being strictly practical in character.

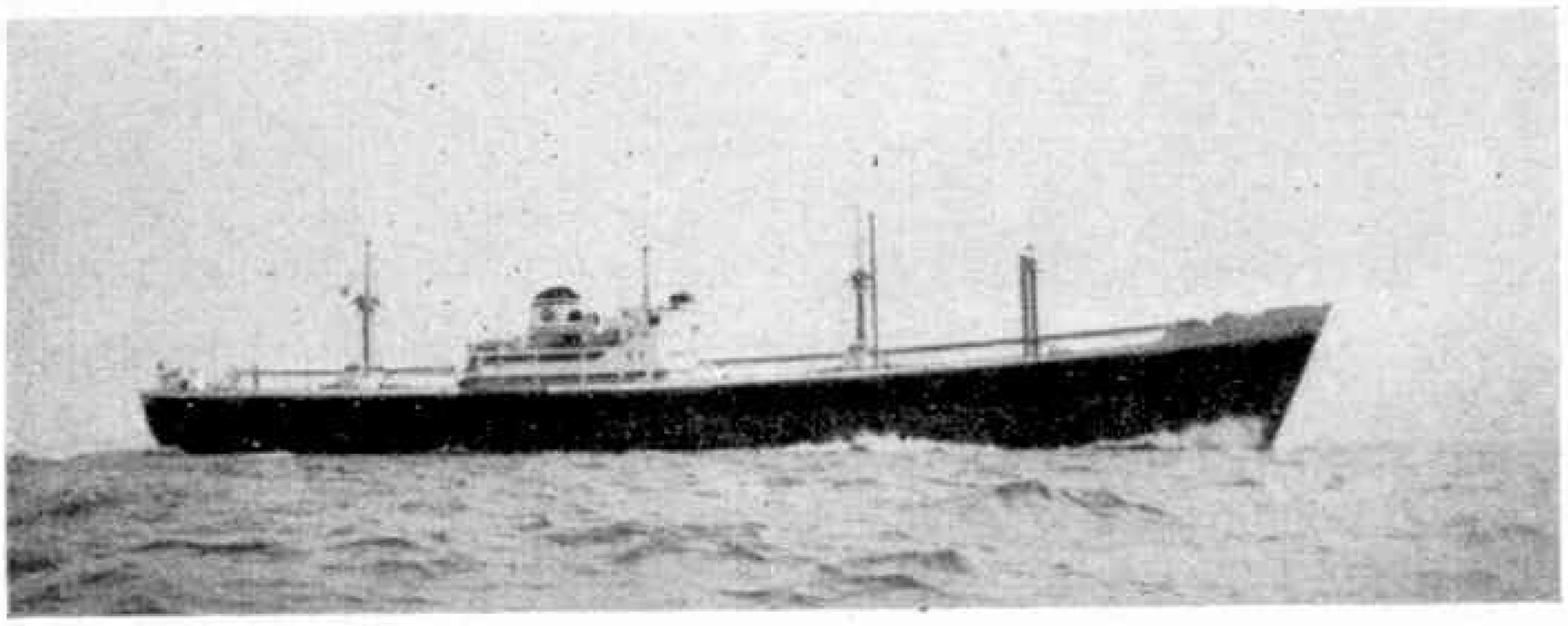
A busy scene at Beeston Lock, on the Trent Waterway. Here there is a four-mile stretch that is especially popular with owners of pleasure craft.

It may interest many readers to learn that it is not necessary to own a vessel to enjoy a cruise on our inland waterways. Pleasure craft for small parties can be hired from firms in various parts of the country, and also from British Waterways. In addition cruises can be arranged in pleasure boats for 16 to 18 passengers each. Day cruises also can be arranged for summer outings by even larger parties. Details of these, with much other information necessary to the canal user, are given in the booklets.

Shipping in the Strait of Dover

By J. Mannering

SOMEWHERE in the archives of Trinity House or the Board of Trade there must be figures to back my belief that the Strait of Dover is the busiest shipping lane in the world.



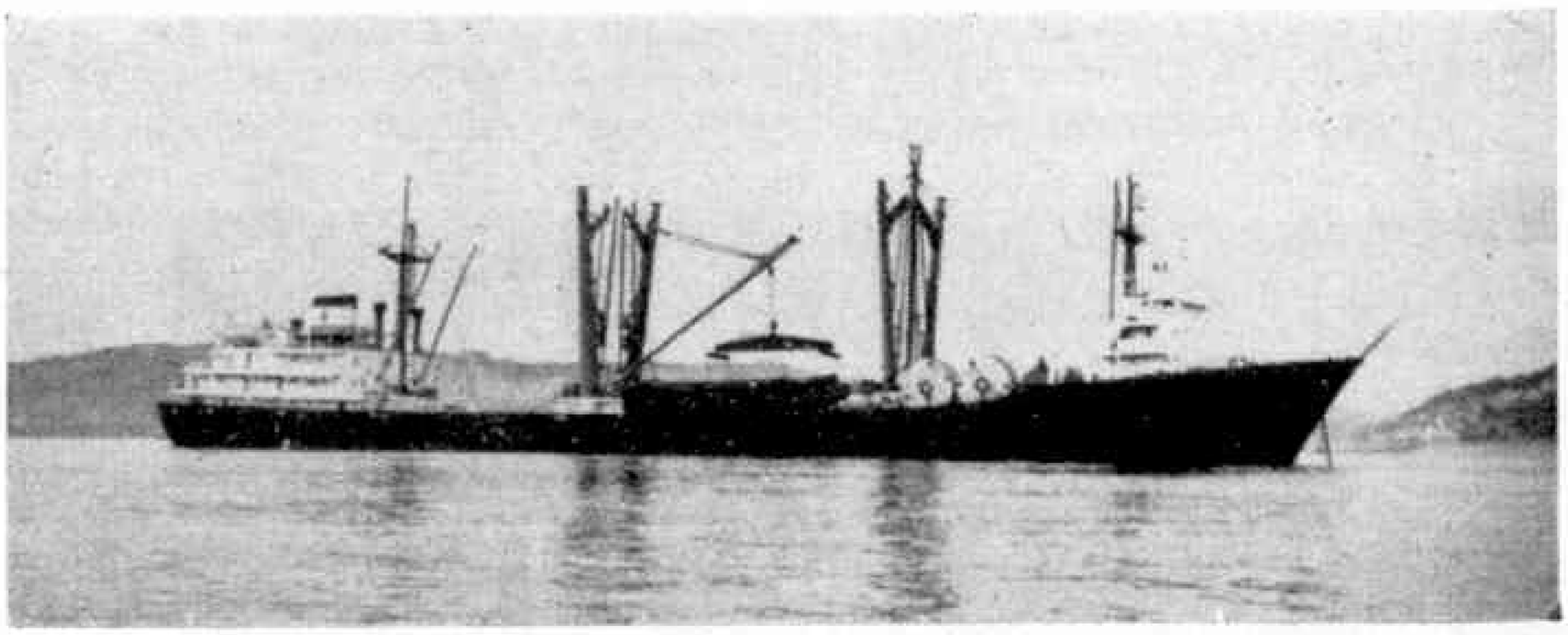
M.V. "King Theseus," 9153 tons, owned by the Dalhousie Steam and Motor Ship Co. in mid-channel.

After sailing and boating from Dover for the last thirty years, I began to feel that I was taking all too much for granted the wonderful panorama of shipping that passes the port. But having come lately into possession of a fine old plate camera, more or less impervious to salt water, like its owner, I have set about collecting as many pictures as possible of all manner of ships passing by, and entering Dover. Shown here are a few of the more interesting vessels that fell into my bag last summer.

The picture of *King Theseus* was taken in a moment of some strain. We were taking part in a race from Dover to Boulogne, and about six miles out we ran into the main steamer track of vessels bound through the Strait. These may be coming from the direction of the East Goodwin Lightship, or may have passed through the Downs, but mostly they pass fairly close to the N.E. Varne buoy, leaving it to the south'ard.

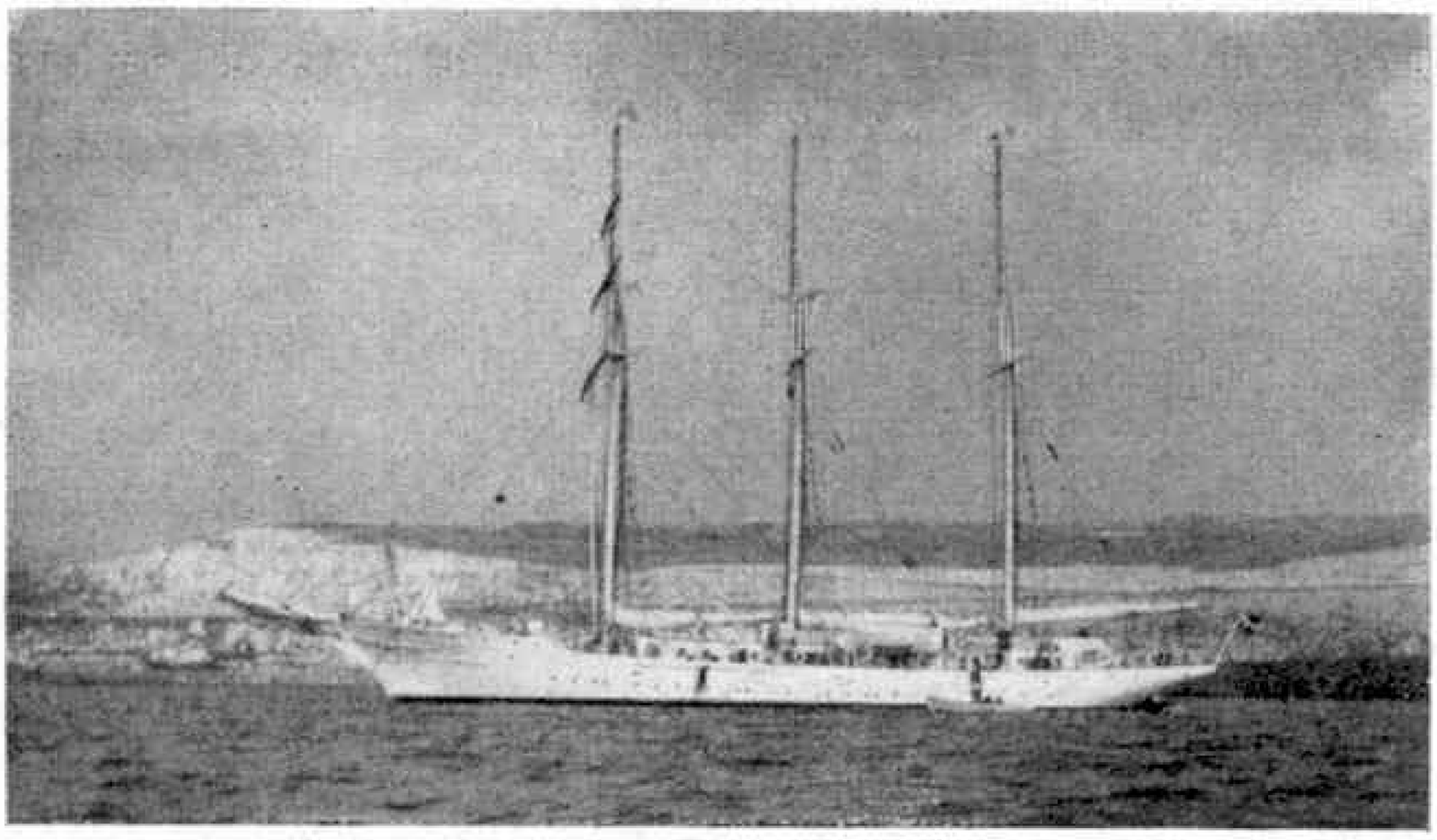
About fifteen yachts were strung out over a couple of miles, right across this steamer lane. Several ships had passed quite comfortably, either ahead or astern of us, when along came *King Theseus*, on a course from outside the Goodwins, making for the N.E. Varne. There were over a dozen yachts in her path, and she evidently found it a little difficult to pick her way through. She certainly gave us a fright, as for some minutes she appeared to be steering right for us, and amidst many exclamations from my crew, my old camera was loaded and we prepared to gather evidence of the impending disaster! But, as always, the ship swung off course at the very last moment, and we obtained this fine picture of her crossing our bows at a distance of about 150 yards.

The big German freighter *Liebenfels*, belonging to the Hansa Line, of Bremen, came into Dover early in the summer to pick up some lighters that she was to take as deck cargo to the Persian Gulf. The lighters were towed round from the Thames, taken alongside the vessel when she was at anchor in the bay, and lifted by her own powerful derricks on to her hatches. In



M.V. "Liebenfels" loading lighters for the Persian Gulf.

the photograph of this vessel one of the lighters is shown, supported by a steel strong-back, just as it was lowered on to the hatch covers. It was fortunate for the whole operation that the weather that



The three masted schooner "Flying Clipper" in Dover Bay on her way back to Sweden.

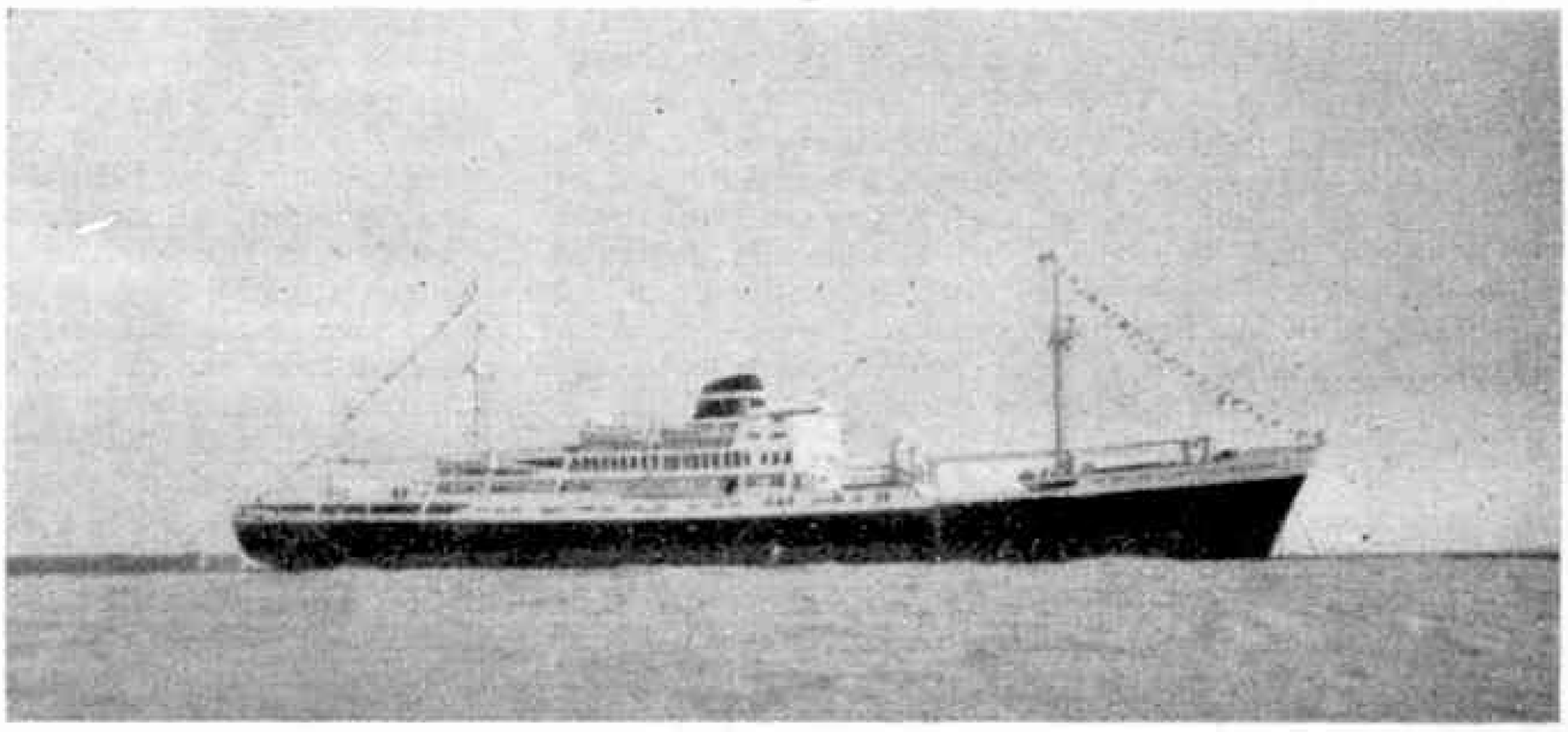
morning was fine and the sea was as calm as it would have been in a dock.

Owing to the position of the bridge, which is unusually far forward, the Master of the *Liebenfels* obtains little help from the prow of the ship as a guide when steering in confined waters, or making for a distant mark. A small mast or staff therefore, at an angle of about 45 deg. and looking like an emaciated old time bowsprit, projects from the bow, enabling her officers to see more clearly exactly where the ship is heading.

The Swedish training schooner *Flying Clipper* spent a night or two at anchor in Dover harbour on her way home from a summer training cruise. I rowed round her to obtain a photograph, and was struck by the wonderful cleanliness and order that pervaded her decks and gear. Not a rope's end appeared out of place, nor was there a speck on her gleaming top-sides.

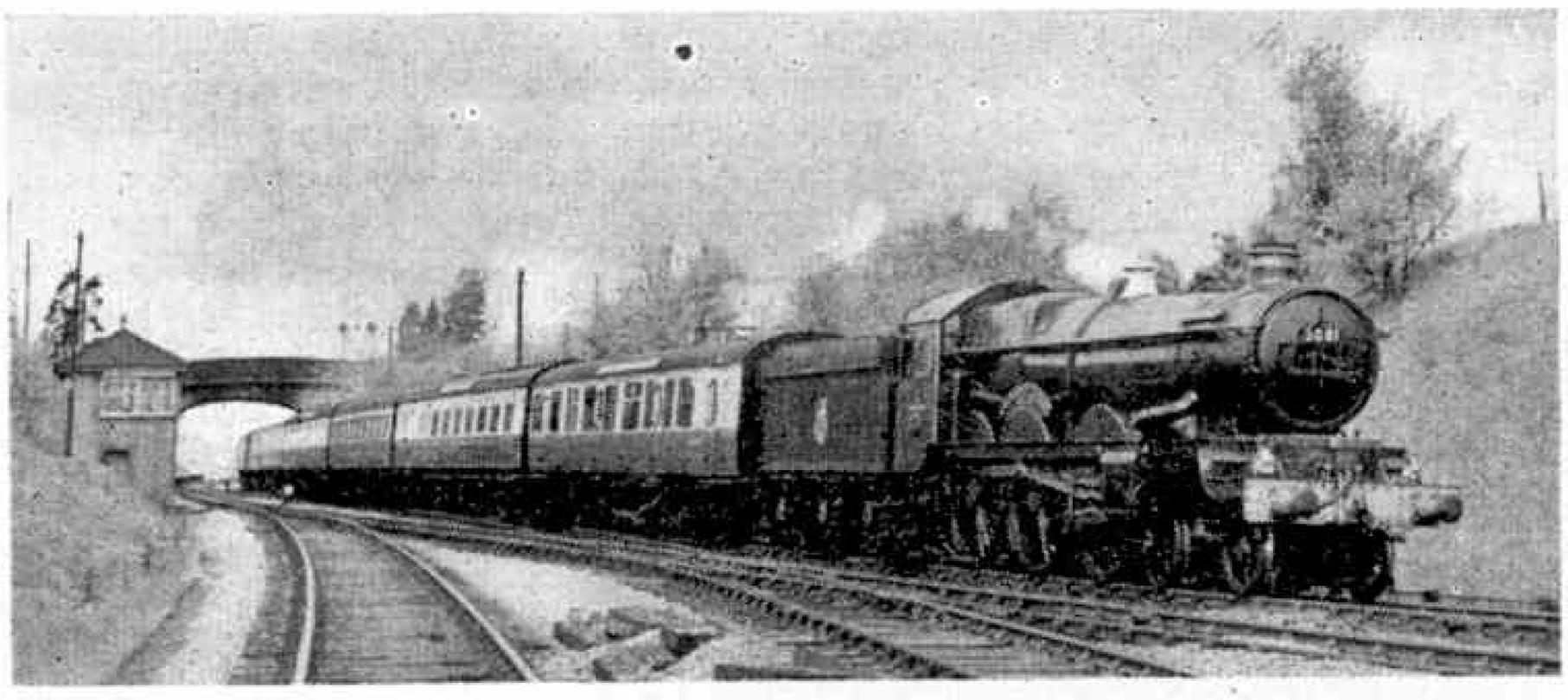
Two days later I watched from the South Foreland as she got under way with a stiff south westerly wind, bound home for Sweden. The performance was a little spoilt perhaps by the inevitable auxiliary motor, for she went out under power, and was some five miles out before she had all her lower sails set. It was a grey day with a white-flecked tumbling sea, and through binoculars she made a fine sight as she headed out past the South Goodwin lightship, her tall masts describing great arcs against the wind swept sky.

The last photograph is of the new passenger liner *Prins van Nederlanden*, belonging to Koninklijke Nederlandsche Stoom Maats of Amsterdam. On this occasion she was paying a courtesy call at Dover prior to starting on her normal run, when Dover will be a port of call on her way from Holland to the West Indies. A westerly gale was blowing at the time of her arrival, and a close look at the picture will reveal that she has two anchors down. When this photograph was taken the wind had veered to the north west, giving me a tough pull back to the shore in the dinghy.



M.V. "Prins van Nederlanden." The new K.N.S.M. liner pays a courtesy call at Dover.

She made a fine picture with her clean paintwork showing up against the heavy grey sky, and dressed overall for the festive occasion, as her Captain and Officers entertained British shipping personalities and local harbour authorities. She made her first trading call at Dover on 27th September, when she picked up passengers on her maiden outward-bound voyage. This also is done regularly by the Swedish pleasure cruise ship *Stella Polaris*.



A Worcester-Paddington express at Norton Junction. The immaculately-groomed Castle 4-6-0 is No. 5081 "Lockheed Hudson." Photograph by R. J. Blenkinsop.

Railway Notes

By R. A. H. Weight

Locomotive News and Doings

New locomotives recently added to stock include class 9 2–10–0s Nos. 92151–2 and 92155, allocated to 21A, Saltley, Birmingham, Nos. 92153 and 92156–8, 18A, Toton; and 92154, 92159–60, 15A, Wellingborough. Diesel-electric six-wheeled shunting type No. D3447 is allocated to 35A, Peterborough, and Nos. D3469–70 to 74A, Ashford, Kent. Diesel-mechanical, six-wheeled shunting 204 h.p. type Nos. 11173–4 have gone to 32A, Norwich.

The 12-wheeled, A1A–A1A main line mixed traffic diesel-electric locomotives now being delivered to the Eastern Region as ready, numbered D5500 upward, are of more pleasing appearance that may become standard, being painted green with broad white lines. They weigh 104 tons, are capable of speeds up to 75 m.p.h., can haul passenger trains of suitable type and are powered by a Mirrlees 12-cylinder 4-stroke diesel engine actuating electric motors designed by the builders, Brush Traction Ltd.

Trials are taking place with No. D600, first of the high-powered diesel hydraulic locomotives intended for the Western Region, built by the North British Locomotive Company, Glasgow, employing oil-pressure, turbine transmission for the first time in a British main line or express engine.

Some time ago I described in these notes a very fast run from Rugby to Euston that improved considerably on the quickest timing of 79 minutes for 82½ miles, with 11 coaches, made by the pioneer ex-L.M.S.R. 1,600 h.p. diesel-electric engine No. 10000, of which a photograph appeared in the same issue, that for April 1956. Mr. Norman Harvey has since logged No. 10203 of 2,000 h.p., the most powerful of the three Ashford-built newer ones, when with 12 coaches, weighing over 400 tons, which is considerably over the normal unassisted load for a steam Jubilee on that schedule, with a completely clear road, 75 m.p.h. was averaged for 70 miles and Euston was reached in 74¼ min. or 4¾ min. early!

One could hardly expect that sort of thing every day, though much good work has recently been done on intensive rosters by the five diesel-electric locomotives that have been in service for some years, not only along the easily graded Euston-Birmingham route but, especially by Nos. 10201–3, on the long London-Glasgow turns with the *Royal Scot* as well as heavy night sleeping car expresses, often on consecutive days covering 803 miles in 24 hours.

I rode behind No. 10000, rated 5P, last September from Derby to St. Pancras. The full 9-coach train weighed about 320 tons gross and was a little late. From Derby to Leicester, 29½ miles were run start to stop in 30 min. with sustained 72 m.p.h. on the level. The diesel was just out of works, looking smart in a fresh shade of green, and it was evidently desired not to exceed about 80 m.p.h., which is a fairly modest figure on a 60 m.p.h. timing over that sharply undulating route from Leicester to London, with tempting downhill stretches. Performance was good though restrained. On approaching St. Albans where there was a long speed restriction, we had covered 79 miles in 80 min., then rapidly accelerating to 80–81 m.p.h. down past Mill Hill and Hendon, could still have arrived in 99 min. as booked. But it was a busy day and signals were against us outside St. Pancras, where a new signalling installation of the latest type has just been brought into use.

More Multiple Unit Diesels and Depots

Various firms are sharing in the production and powering of numerous diesel trains for local or cross-country services, usually in sets of two drivable from either end with one of the cars as the motor coach equipped with two horizontal underfloor 6-cylinder, 150 h.p. engines. There are variations and some of them have a higher power output. The drive in the majority, of the mechanical type, incorporates cardan shaft, free wheel and four-speed epicyclic gearbox. There are also 3-coach sets with engines in each of the end cars. Sets can be coupled together, and controlled from any of the driving cabs by one driver.

Much improved and more frequent services, attracting increased patronage, have lately been introduced with these sets in the Darlington–Middlesbrough–Co. Durham, Norwich–Cromer, Yarmouth–Lowestoft, Grantham–Lincoln (providing fast London connections), and Derby–Stoke-on-Trent–Crewe–N. Wales areas and elsewhere, with others planned to begin soon and in addition to a number mentioned in previous issues.

Among well equipped maintenance and stabling depots for diesel sets or locomotives are the fine new buildings at Crewe and Darlington. The ancient, pioneer and primitive Stockton and Darlington Railway locomotives *Locomotion* and *Derwent* stand on their pedestals in Darlington station, close to the tracks now carrying frequent diesel as well as long distance, high-speed steam trains.

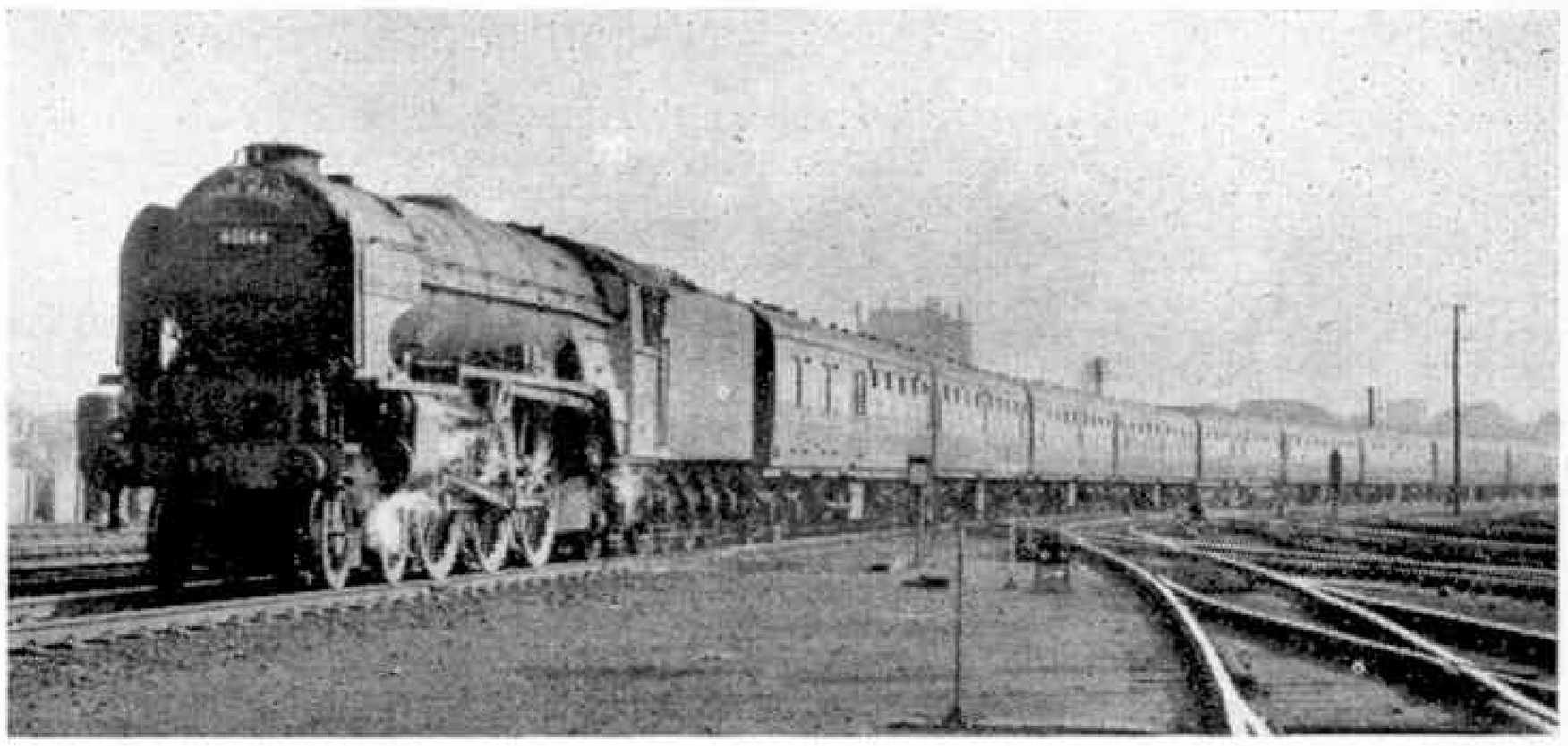
Aboard "The Fair Maid"

The bulk of British express and main line haulage is still in the hands of steam locomotives, on the whole with a high standard of performance. I was delighted to have the opportunity of travelling luxuriously throughout by *The Fair Maid*, 7.50 a.m. King's Cross to Perth, one of the newest and fastest Anglo-Scottish services, on a fine and mostly bright day. It was a spotless maroon train formed of nine new or recently

built coaches, including two 1st Class restaurant cars for all passengers. The engine to Newcastle was A1 4–6–2 No. 60144 *King's Courier*, stationed and ably manned at King's Cross. Load about 320 tons.

Owing to some congestion with shunting movements, the start was 4 min. late and this provided added zest. The long rise to Potters Bar was completed at 57–58 m.p.h. and we were through Hitchin, 32 miles, in 33¼ min. Over the next 20 miles speed averaged 87, with maxima of 90–91½ m.p.h., and there was a signal check before Huntingdon, but Peterborough, 76½ miles, was passed at the usual gentle pace in less than 70 min.

The lateness had been made up and now all the way on to Darlington, in Co. Durham, we were ahead of time, although having to make a short signal stop on the approach to Retford and running fairly easily onward from there towards York. Doncaster, 156 miles, was passed in exactly 2½ hrs. York, the great station and yards where a photographer friend was waiting being passed very carefully, 188 miles in 186 min. Then speeds round about 77–80 over the nearly level, very fast stretch, brought us into Darlington, the first booked stop, 232¼ miles in 226 min., 2 min. early, or about 220 min. nett. The first 132 miles had been covered in 2 hrs.



The "Fair Maid" in charge of No. 60144 "King's Courier" passing York on the occasion of the journey described on this page. Photograph by C. Ord.

Getting now into more hilly country and an industria belt, chances of high speed were fewer until well past Newcastle. The curves and sharp changes of gradient through impressive Durham were taken cautiously. We were held at another spectacular point on the curved approach to King Edward Bridge over the Tyne, as the platform in Newcastle, Central, was not ready for us. *The Flying Scotsman* southbound non-stop to London passed, headed by *Mallard*.

Scottish Pacifics shedded at Haymarket. Edinburgh, took charge for the rest of the run, A2 with smaller, 6 ft. 2 in. driving wheels No. 60530 *Sayajirao*, from Newcastle to Edinburgh, Waverley, having worked the southbound *Fair Maid* that morning in the opposite direction, and A3 No. 60100 *Spearmint* forward to Perth.

The new 123-minute timing for 124½ miles, Newcastle–Edinburgh, over a route of some difficulty, is very exacting. A 5-min. late start from Newcastle, a severe check before getting going fully, and a long track-repair slack about 30 miles out produced between them a debit of over 10 min., and though overall time was not quite kept and uphill work was not as brilliant as sometimes, there was a maximum of 87 m.p.h. down Cockburnspath bank and arrived in Waverley only 7½ min. late, after passing much grand coastal and hill scenery. We had come from London, 393 miles, in less than 6 hr. 50 min., including four stops.

This is a route of great bridges. The greatest and most imposing of all traversed that day was now to come. One wants to be looking out of windows on both sides at once while crossing the giant Forth Bridge, but as it is long and speed low there is good chance of extensive vistas inland as well as to the sea.

The ex-L.N.E.R. route to Perth is not very pretty in places, but it is direct and involves much climbing, for which the schedule allows. Smart station work in Edinburgh enabled us to get back to booked time. We parted company with the main lines to Glasgow and to Dundee–Aberdeen, and made a brief call at Dunfermline. A final sharp descent then brought us on to the West Coast trunk route, to draw up in the General Station, Perth, at 4.16, 2 min. before time.

The 441-mile journey had been accomplished from London to the southern Highlands in 8 hr. 22 min. and on a regular service train by day. Until the introduction of the *Fair Maid* nothing like it had been possible except by air perhaps. It had been a splendid trip!

* * * *

A new express freight train now leaves Niddrie West (Edinburgh) in the early morning for Wolverhampton, where connecting services take traffic forward to the Midlands, the West of England and South Wales. Each week there are now more than 460 express freight trains serving the Scottish Region and the industrial cities of Scotland and England.

A Kent Coast train approaching London Bridge. The remarkable smoke effect is being produced by a light Pacific, thought to be No. 34096 "Trevone." Photograph by A. Davenport.

Russia's Civil Air Fleet

By John W. R. Taylor

IT was bad luck for Russian aircraft designers that their latest civil air liners should have been produced at about the same time that two *Sputnik* earth satellites began orbiting around the World at vast speeds. At any other time, the great Tu–114 turboprop transport and Mi–6 helicopter might have filled the headlines for days; but they could not hope to compete with the first space traveller, even if it was only a little dog named Laika.

However, we shall be flying around in aeroplanes rather than rockets for a good many years yet; so it is interesting to study these new Russian aircraft and to try and get some idea of how they compare with those built in the West, because there is little doubt that the Russians intend to enter the export business in a big way.

The picture at the head of this page shows the great Russian Tu-114, the largest air liner in the world. It has sufficient range to fly non-stop from Moscow to New York.

A first indication of the high quality of modern Soviet aircraft was given by the MiG–15 fighter during the Korean War and by the series of new jet bombers, fighters and research aircraft that later put in an appearance during the annual May Day and Aviation Day fly-pasts over Moscow. But it was not until Tu–104 jet-liners began to visit airports in Europe and America that most of us got our first close look at an up-to-date Russian design.

What we saw was surprising in many ways. Efficient workmanlike engineering and advanced technical features were combined with cabin furnishings that seemed to come from an 18th century drawing room and an underground railway train. Glass cases containing porcelain figures separated the cabins. There were lace mats on the tables, hand-embroidered curtains, strangely out-of-place clumsy string-mesh hat-racks; ugly black tubes for oxygen masks by every seat—and no safety belts for the passengers.

Yet this is an aircraft able to carry 50 passengers on stage-lengths of up to 2,000 miles at 515 m.p.h., and it was in service with the national airline Aeroflot in September, 1956, when no other airline in the world could offer its customers the speed and comfort of jet travel. It is, in fact, very similar in size and performance to the Comet 4 which B.O.A.C. will not have in service until next year.

Because of all this, some folk seem to credit the Russians with a kind of magic touch that produces aeroplanes in record time and makes every one a winner. This is nearly as silly as the opposite view, that these aircraft were really designed by Germans who went to Russia after the war, or that they are no good because they are only converted bombers.

It is true, of course, that many German scientists and designers did go to Russia in 1945–46, and that some are still there. But the results of their wartime research were for the most part available to Britain and America as much as to Russia; and the MiG–15 owed little more to German

influence than did the North American Sabre. What is certain is that it would not have been the fighter it is if our Socialist Government had not let the Russians have 25 Rolls-Royce Nene turbojets to copy and put into production in 1947. This, coupled with the work on turboprop engines by a German team in Kubishev in recent years, represents Russia's main debt to the West.

Part of the passenger accommodation in the Tu-104 air liner. "Soviet Weekly" photograph.

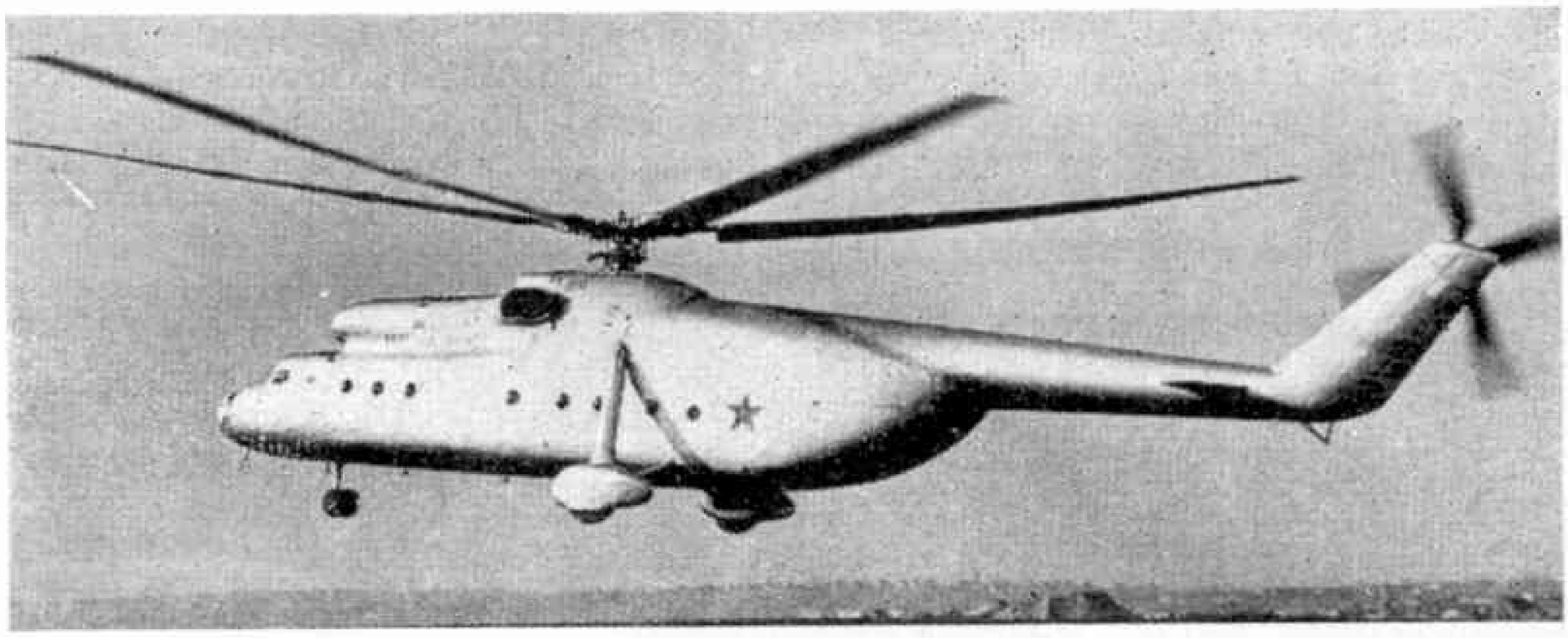
The undercarriage retraction schemes used on the Tu–104 and An–10 transports appear to have been "lifted" from the Vickers Valiant B.Mk.2 bomber and Lockheed Hercules transport respectively, but if such details are copied it must be done to save time rather than through any lack of original ideas, and we shall only delude ourselves if we believe Soviet designers are any less brilliant than our own.

Men like Andrei Tupolev have been in the business for a very long time, and they are paid well and honoured frequently by the Russian Government for their services. They are also encouraged to lecture to students, for Russia sets great store on good technical education and is turning out 2½ times as many young scientists and engineers per head of population than is Britain.

Of course, Tupolev does not necessarily design personally all the types which bear a "Tu" designation. It seems almost certain that men of his calibre, including Sergei Ilyushin, Oleg Antonov and Aleksandir Yakovlev, are put in overall command of a "design bureau", in which several other able designers are each made responsible for one new design. This would account for reports that the "Tupolev" turboprop bomber that we know by the code-name of *Bear* was designed by Myasishchev, and why Yakovlev apparently has the versatility to turn out such widely-different designs as the twin-jet Yak–25 fighter, the tandem-rotor Yak-24 helicopter, the Yak–16 light air liner and the Yak–18 primary trainer.

It would be quite wrong to assume that just because we never hear of any flops there aren't any. Russia probably has great flight test centres like our Boscombe Down and America's Edwards Air Force Base tucked away somewhere behind the Ural mountains, where all new prototypes are put through their paces, as a result of which we see pictures of only those designs that are chosen for production and service.

The Il-18 Moscow turboprop air liner at Vnukovo airport, Moscow. "Soviet Weekly" photograph.



The picture above shows the twin-engined, 27-ton, Mi-6, the world's biggest helicopter. It can carry up to 80 passengers.

Having sorted out these wrong ideas, how good are the aircraft that we do know something about?

To start with, we must remember that different countries have different standards of airworthiness and comfort, and even of safety. Those missing seat-belts on the Tu–104 are an example, because belts are a "must" in the West; and the fact that at least two Tu–104's are known to have run off the end of the runway after landing, giving their passengers a rough time, serves to emphasise the wisdom of this ruling.

The AM–3 turbojet used in the Tu–104 is a large simple engine which develops anything up to 20,000 lb. thrust in its military form. It is derated for civil use and this increases its reliability and life between overhauls. Similarly, the Kuznetsov NK–12M turboprop that powers the Tu–114 air liner gives the enormous output of 12,000 h.p.; but it should be remembered that it is a very large engine —the rotating compressor-turbine assembly alone weighs a ton—and an engine of any required power can be produced if the designer is allowed to make it big and heavy. This does not detract from the achievements of the people who designed these Russian jet and turboprop engines, which are the most powerful in service anywhere; but it does help to keep them in perspective, and it is probably safe to say that, pound for pound, British engines are still the best in the world.

The Tu–104, which uses many components of the Tu–16 *Badger* bomber, has been followed recently by the Tu–104A, a 70-seat tourist version with two improved turbojets developed by Zubets from Mikulin's original AM–3. This aircraft has shown its paces by breaking 12 official records, of which the most notable have been to lift a load of over 20 tons to a height of 38,713 ft. and to cover a 620-mile closed circuit at a speed of 604 m.p.h. carrying a ten-ton payload. The last flight broke a record held previously by the Saab–29 jet-fighter.

Similar, but with four 12,000 lb. thrust Lyulka turbojets and somewhat bigger span and length, is the 50–100 seat Tu–110.

Turning to turboprop air liners, the first to appear was the Antonov An–10 Ukraine. Designed to operate from small rough airfields, it is a sturdy, good-looking machine, powered by four 4,000 h.p. Kuznetsov NK–4 turboprops and carrying 84–126 passengers according to whether or not a galley and cargo space are needed. Construction of the prototype began in November 1955, it flew in February 1957 and the type is expected to enter service with Aeroflot this spring, which is remarkable going. It is almost as big as the Britannia, with a span of 140 ft., but weighs a good deal less (53 tons) and has a maximum range of 2,700 miles at 300–340 m.p.h.

Slightly heavier is the Ilyushin Il–18 Moscow, which is the most "westernised" of all Russian air liners, with a very smart cabin, and it is claimed, the lowest operating costs of any transport in the world. With the same engines as the Ukraine, which will probably be replaced in time by an improved version designed by Ivchenko, it carries 75–100 passengers on stage lengths of 1,240–3,100 miles at a normal cruising speed of 360 m.p.h. It is, in fact, in much the same class as the new Lockheed Electra, with a span of 122 ft. 8½ in. and loaded weight of 57 tons;

(*Continued on page 110*)

MECCANO MAGAZINE

Junior Section

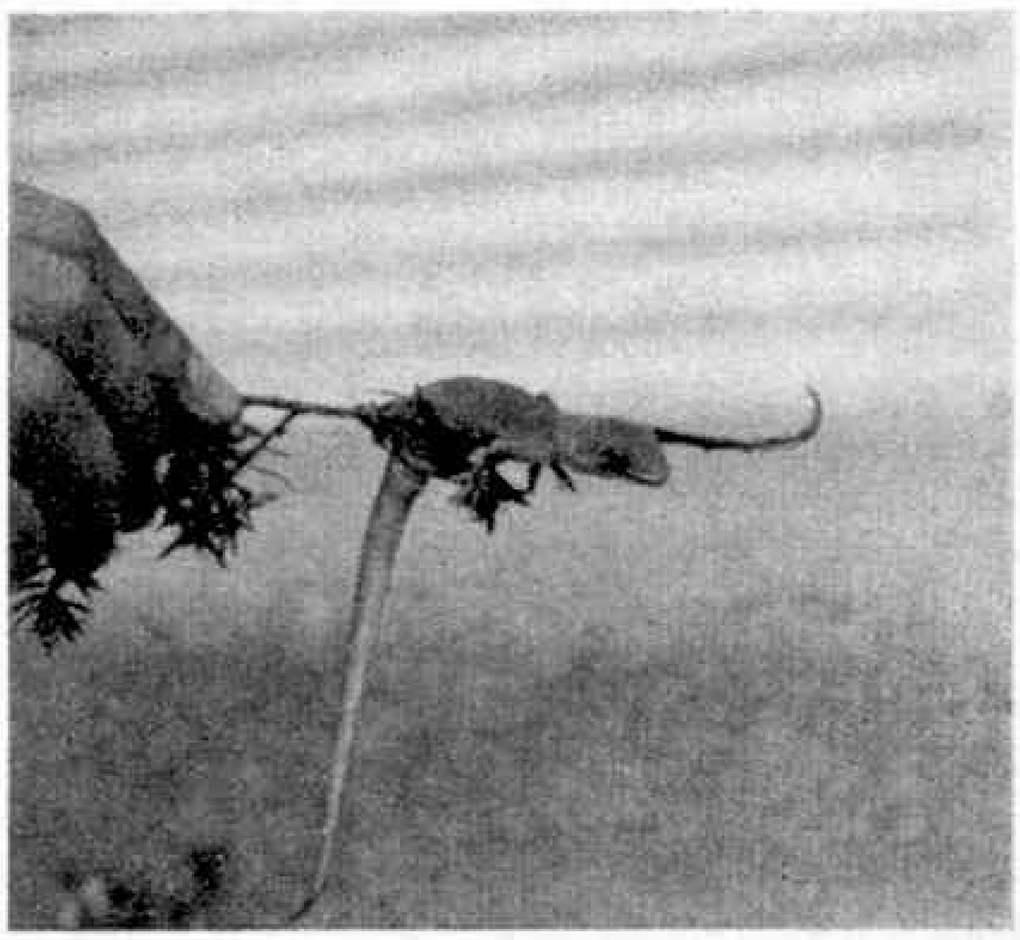
LAST May I was able to include in the *M.M.* a very interesting article by L. H. Newman on the Green Lizard, in which he told the story of seeing many of these creatures in the Channel Islands, and of collecting them. Now I have heard from a New Zealand reader who actually had a Green Lizard as a pet. A picture on this page shows the Lizard itself, and its size can be gathered by comparison with the part of the hand of the reader that also shows.

The owner of this interesting Lizard is Lindsey Roke, of Matakana, New Zealand. She was given the name Niannorlin and was very tame, always ready to sit quite happily on the hands of her owner, or of other members of the family. She lived chiefly on flies and honey. Unfortunately she was always disappearing, as she could make her way through the tiniest cracks, and eventually she was found dead under a heavy book.

The upper picture on this page is from a photograph by another reader of the *M.M.* He is A. B. Partridge, and lives in Eastern Nigeria, but he took the photograph in Scotland. The animal seen in it is a newly born Scottish wild deer.

"My wife and I were hill walking west of Fort William in June," writes Mr. Partridge, "when I had that familiar and tantalizing sight of a stag watching me from the skyline a quarter of a mile distant, while his herd trotted away in single file. My next view was of three hinds going slowly uphill only 100 yards away. The reason for their slowness, we soon saw, was a small fawn staggering behind them.

"By the time I had handed over my pack, and opened my camera, they were passing out of sight into a fold in the hillside. Nevertheless, I struggled up as fast as I could to what I hoped would prove a point of vantage. My progress through boulders and bracken was not particularly rapid or silent! Before I reached the point I had marked, my wife called out to me and I was astonished to see the fawn lying watching me ten yards off to one side. He had 'gone to earth' just after I last saw him. I was able to close right up until he filled the viewfinder, and only at the click of the shutter did he jump up."



Easy Model-Building

Spanner's Special Section for Juniors

Aircraft Carrier and Aeroplane Roundabout

FOR the benefit of new readers, of whom there is usually a large number at this time of the year, it should be mentioned that the models we illustrate and describe in the "Easy Model-Building" Section each month are specially designed to interest those who have only small Outfits or limited experience in the use of Meccano parts. All the models dealt with are described in detail and will be found quite easy to build.

The Aircraft Carrier shown in Fig. 1 can be built from Outfit No. 1. For each side of the hull you will require two $2\frac{1}{2}$" and two $5\frac{1}{2}$" Strips, joined together to provide made-up strips 7" in length. These strips should be bent slightly as shown and connected together by Fishplates held by bolts 1 and by another Fishplate 2. One of the bolts 1 on each side secures also an Angle Bracket, and a Flat Trunnion bolted to the Angle Bracket is used to connect the sides of the hull together.

To make the flight deck bolt together two $5\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plates and attach them to one side of the hull and to the stern by means of Angle Brackets. Use the bolts that fix the Plates to the Angle Brackets at the stern to support also a Trunnion 3, which fills in the stern of the model. Fix a Flat Trunnion and a $2\frac{1}{2}"$ Stepped Curved Strip to the front ends of the Flexible Plates.

The superstructure is made by bolting two $2\frac{1}{2} \times \frac{1}{2}"$ Double Angle Strips 4 together through their lugs, using one of the bolts to attach them to a $\frac{1}{2}"$ Reversed Angle Bracket 5 fixed to the flight deck. Two Angle Brackets are bolted to the free lug of the Reversed Angle Bracket. To make the support for the mast fix a Fishplate to an Angle Bracket and bolt the assembly to one of the Double Angle Strips 4. Use a $3\frac{1}{2}"$ Rod for the mast, passing it through the Fishplate and a hole in the flight deck, with Spring Clips to hold it in place. For the funnel fix two 1" Pulleys on a 2" Rod, pass the Rod through a hole in the flight deck and fasten it in place with a Spring Clip.

A list of the parts required to build this model is given at the end of this article.

You should begin building the fascinating working model Aeroplane Roundabout shown in Figs. 2 and 3 by making the base. All the parts required to build the model will be found in Outfit No. 3. Bolt two $5\frac{1}{2}" \times 2\frac{1}{2}"$ and two $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates to the sides of a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate, and connect the lower corners of the Flexible Plates with $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips.

Fasten four Angle Brackets to the Flanged Plate as shown and use each one to support a $5\frac{1}{2}"$ Strip. You must bolt together the upper

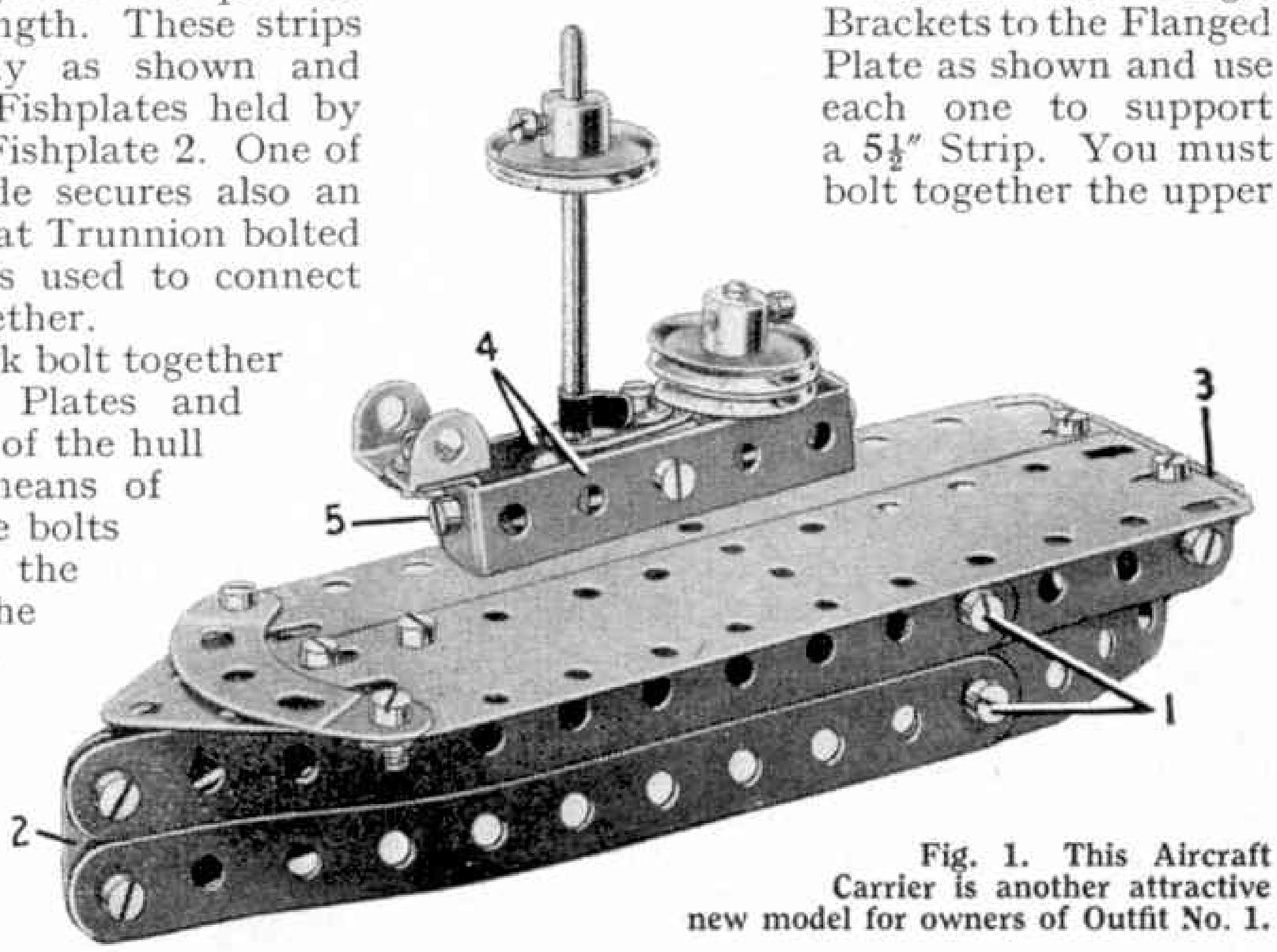


Fig. 1. This Aircraft Carrier is another attractive new model for owners of Outfit No. 1.

ends of the two Strips on each side, and connect them to the Strips on the other side by a Double Bracket 1, using the same bolts to support $2\frac{1}{2}"$ Strips 2. The Strips 2 are braced to the $5\frac{1}{2}"$ Strips by two $2\frac{1}{2}"$ Stepped Curved Strips on each side, and a Double Bracket 3 is bolted between the upper ends of the Strips 2. Take care to arrange the bolts that pass through the Strips 2 with their heads on the inside.

The arms that support the aeroplane are formed by a $12\frac{1}{2}"$ Strip with a Bush Wheel bolted centrally to it. You must fix the Bush Wheel on the upper end of a 4" Rod

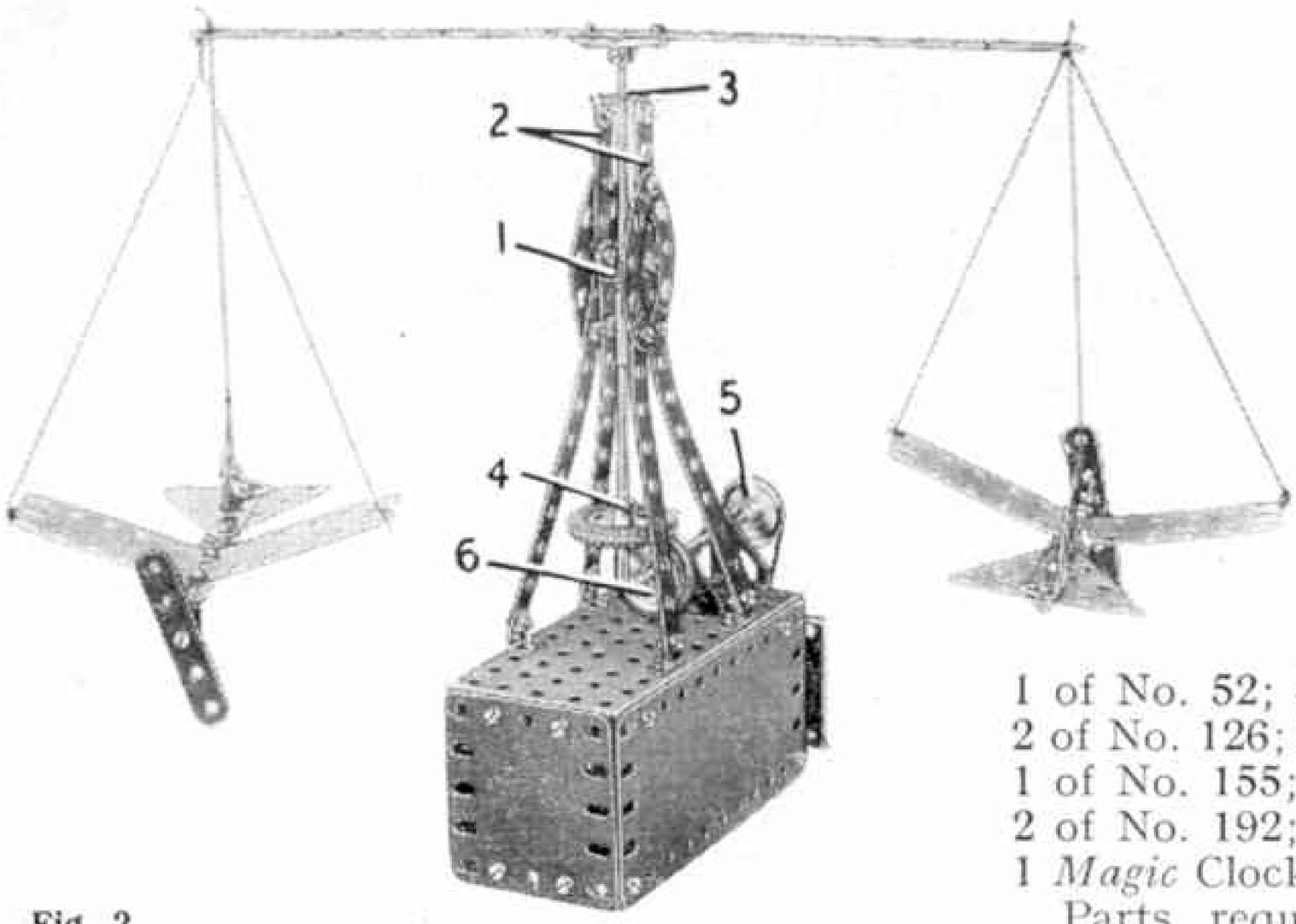


Fig. 2.
A fascinating model Aeroplane Roundabout of the type to be seen in some pleasure fairs. The model can be built from parts in Outfit No. 3.

mounted in the Double Brackets 1 and 3, and extend this Rod with a 3½″ Rod joined to it by a Rod Connector. Fix a 1″ Pulley 4 on the 3½″ Rod and fit it with a Motor Tyre.

If you have a *Magic* Clockwork Motor available you can make good use of it to drive this model. You should bolt the Motor to one end of the base and connect its pulley by a Driving Band to a 1″ Pulley 5 on a 4″ Rod. Mount the Rod in Trunnions bolted to the Flanged Plate and use Spring Clips to hold it in place. To complete the drive fix a 1″ Pulley 6 on the 4″ Rod and fit a Rubber Ring to it. Position the Pulley 6 so that the Tyre on Pulley 4 bears against the Rubber Ring. If you do not own a *Magic* Motor you should replace the 4″ Rod with a Crank Handle, so that you can operate the model by hand.

The fuselage of each aeroplane is a 5½″ Strip and the wings are formed by a 5½″ × 1½″ Flexible Plate bolted to the Strip. For the tail unit use two 2½″ × 1½″ Triangular Flexible Plates bolted to the 5½″ Strip, and a Flat Trunnion attached to an Angle Bracket. To complete each aeroplane lock-nut a 2½″ Strip to an Angle Bracket, and bolt the latter part to the front of the fuselage. The aeroplanes are suspended from the rotating arms by Cord as shown.

You should take care to see that the Driving Band from the Motor pulley to the Pulley 5 is not too tight, otherwise the model may not work satisfactorily. A spot of light machine oil on the bearings of the Motor will help in smooth running.

Parts required to build the Aeroplane Roundabout: 1 of No. 1; 6 of No. 2; 4 of No. 5; 2 of No. 11; 8 of No. 12; 2 of No. 15b; 1 of No. 16; 3 of No. 22; 1 of No. 24; 2 of No. 35; 56 of No. 37a; 50 of No. 37b; 8 of No. 38; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 4 of No. 90a; 4 of No. 111c; 2 of No. 126; 2 of No. 126a; 1 of No. 142c; 1 of No. 155; 2 of No. 189; 2 of No. 190; 2 of No. 192; 1 of No. 213; 4 of No. 221; 1 *Magic* Clockwork Motor.

Parts required to build the Aircraft Carrier: 4 of No. 2; 4 of No. 5; 4 of No. 10; 8 of No. 12; 1 of No. 16; 1 of No. 17; 3 of No. 22; 3 of No. 35; 23 of No. 37a; 21 of No. 37b; 2 of No. 38; 2 of No. 48a; 1 of No. 90a; 2 of No. 111c; 1 of No. 125; 1 of No. 126; 2 of No. 126a; 2 of No. 189.

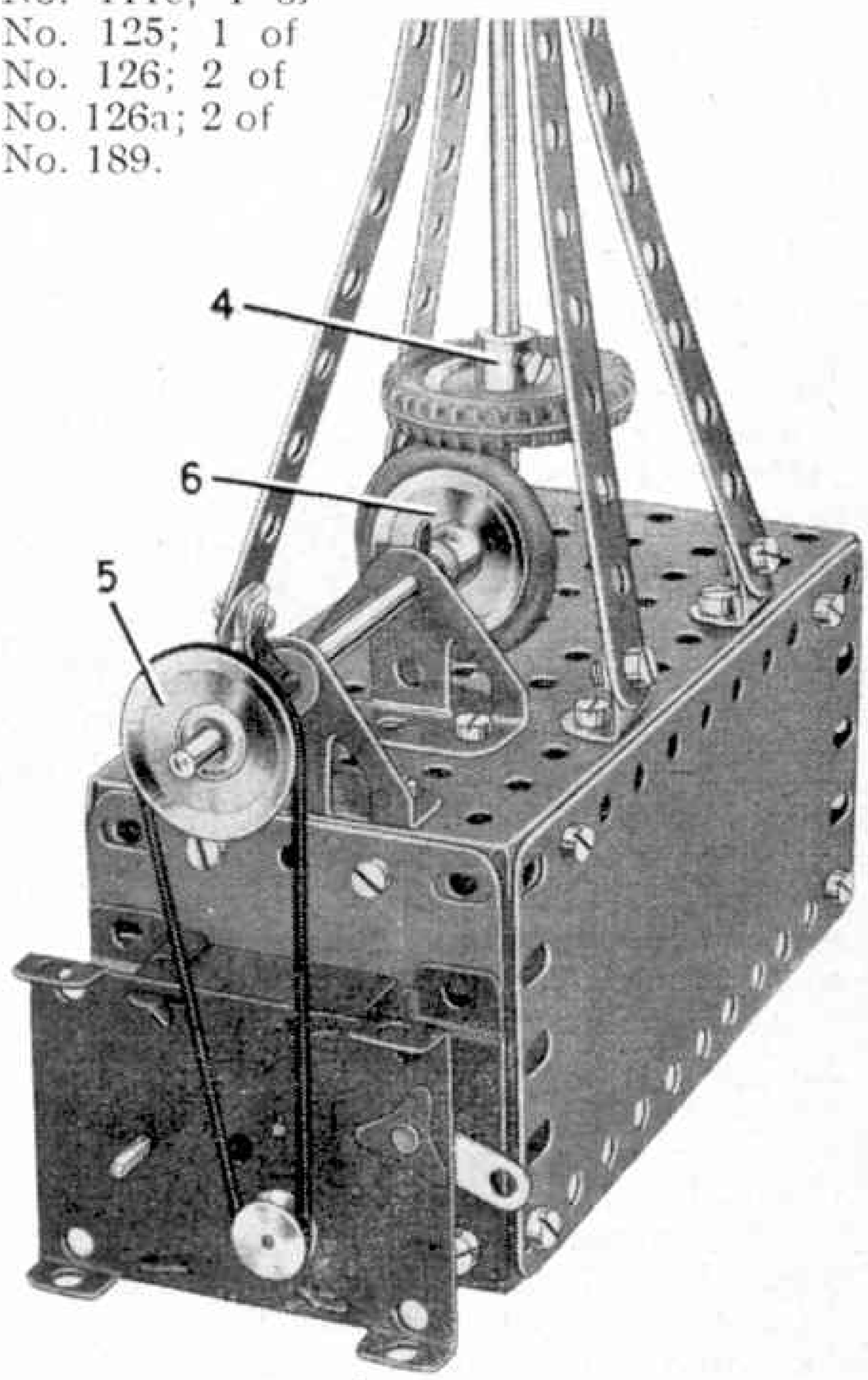


Fig. 3. A close-up of the friction drive arrangement to the centre spindle of the Aeroplane Roundabout.

DINKY NEWS

For Dinky Toys Club Members and All Dinky Toys Enthusiasts

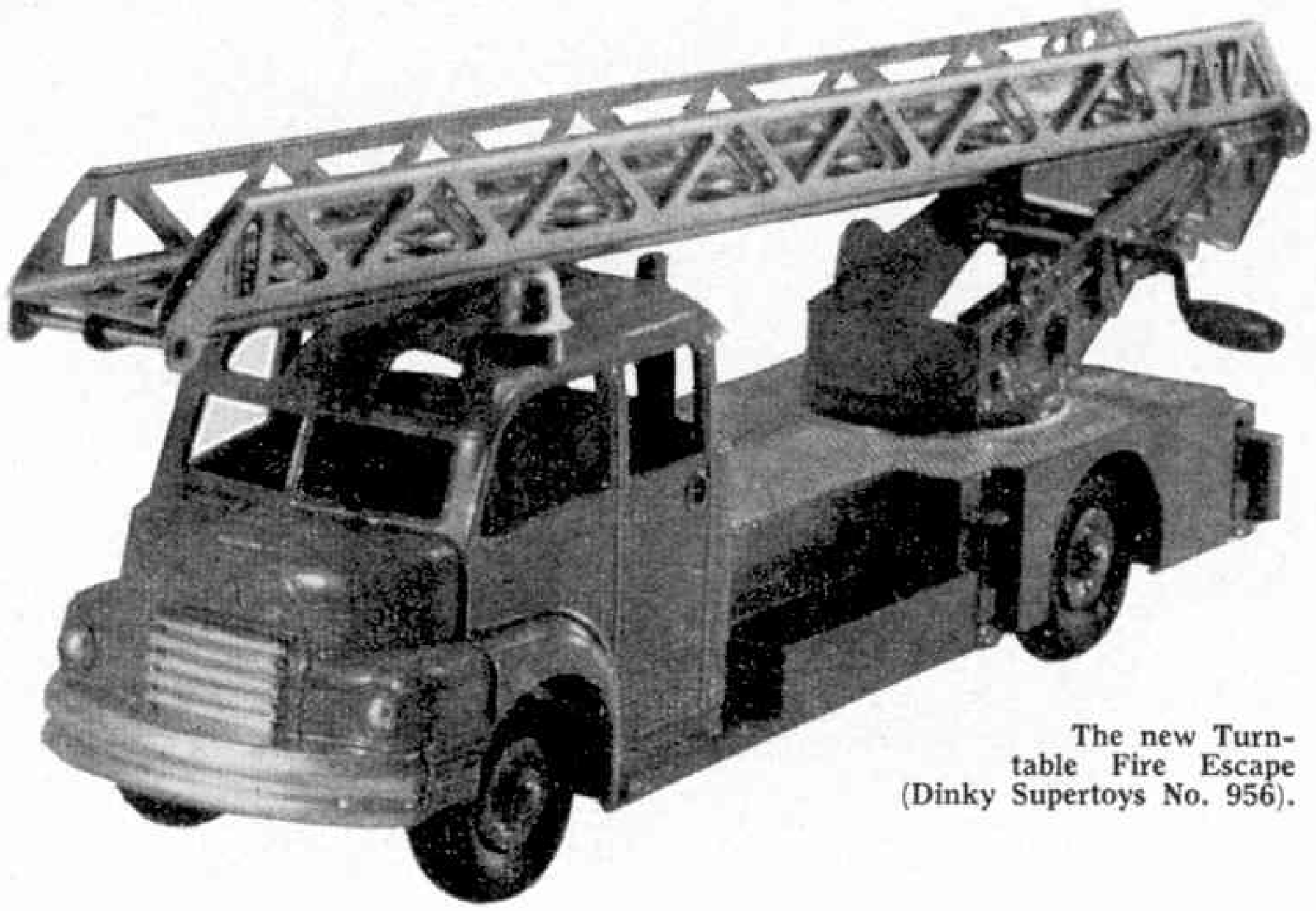
By **THE TOYMAN**

AMONG Dinky Toys Club members who have written to me recently is a young man from far off Argentina who is fortunate enough to own one of the best collections of Dinky Toys and Supertoys that has come to my notice. These he has collected after considerable difficulty, as import restrictions operating in that country at the present time severely limit the number of Dinky Toys available to enthusiasts living there. He has snapped up every opportunity to obtain a new model that has come his way, and the fine collection he has managed to assemble is shown in the illustration on this page, together with its young owner, Julio Antonio Lascano, who lives in Buenos Aires. I am sure you will all join me in congratulating Julio on his achievement and in sending him good wishes from Dinky Toys Club members everywhere.

This extensive collection of Dinky Toys is the treasured possession of our Argentinian friend Julio Antonio Lascano, who lives in Buenos Aires. Julio, seen in the picture, is a keen Club member.

And now I have some really good news for you concerning the latest addition to the splendid range of Dinky Supertoys. It is a remarkable realistic miniature of a Turntable Fire Escape, and it is shown in the upper illustration on the facing page. This wonderful new model is assured of a great reception, as we have received hundreds of requests that we should produce a model of this type, and now that it has finally appeared it will be eagerly sought after by collectors wishing to add the fine touch of realism to their layouts that a model of this kind, full of character as it is, can give.

The new model is Dinky Supertoys No. 956, and its striking finish in brilliant red, with silver coloured deck and nickel-plated escape ladder, will ensure that it stands out prominently in any Dinky Toys collection. The chassis is full of finely moulded detail, including representations of stabilizing outriggers, and it carries two nickel-plated warning bells placed one each side of the cab roof. The escape ladder itself is finely made in sheet metal and operates smoothly and precisely. It can be extended by turning a handle on the ladder mounting, and a second handle is provided for adjusting the angle of elevation. The ladder is mounted in a cradle on a turntable that can be swivelled



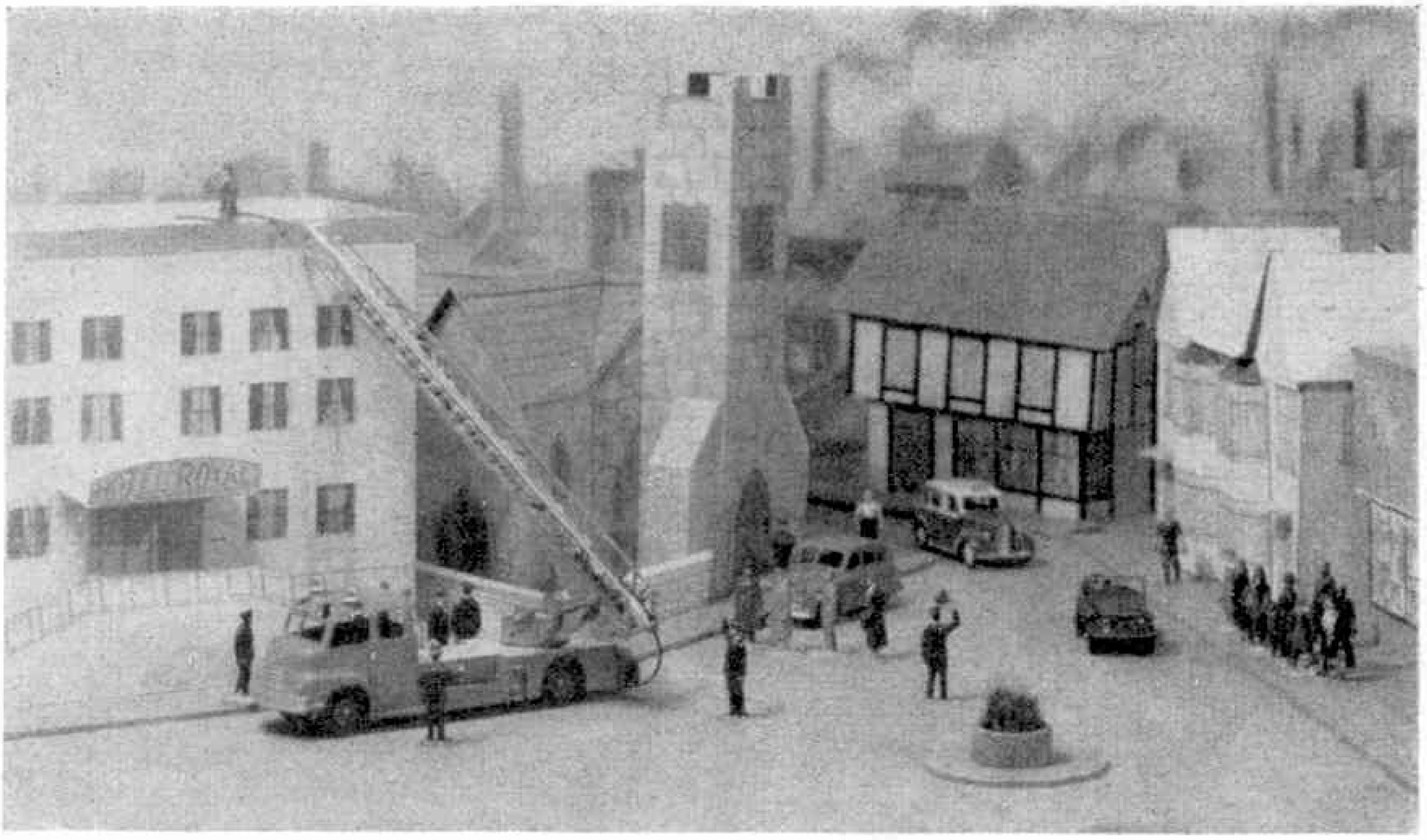
The new Turntable Fire Escape (Dinky Supertoys No. 956).

in a full circle, so that it is possible for the ladder to be placed at any required point.

Some idea of the splendid effect given by the new Supertoy can be gained from two of the accompanying pictures, which show a section of a small town layout. In one of the pictures we see a Turntable Fire Escape and a Fire Engine, with Extending Ladder (Dinky Supertoys No. 955) leaving the Fire Station to answer an emergency call. The oncoming traffic is being held up to facilitate the rapid departure of the fire machines, and as is usual when something like this happens in real life, there is a little knot of curious onlookers attracted by the clanging bells and brilliant appearance of these fascinating machines.

In my other picture we have arrived at the scene of the fire, which is on the upper floors of a large hotel. In this picture we can see the Turntable Fire Escape with its ladder partly extended. Apparently the firemen have got the blaze well under control, but a few onlookers

The fire alarm has been raised and here we see the new Turntable Fire Escape, accompanied by the Fire Engine with Extending Ladder (Dinky Supertoys No. 955), leaving the station for the scene of the fire.

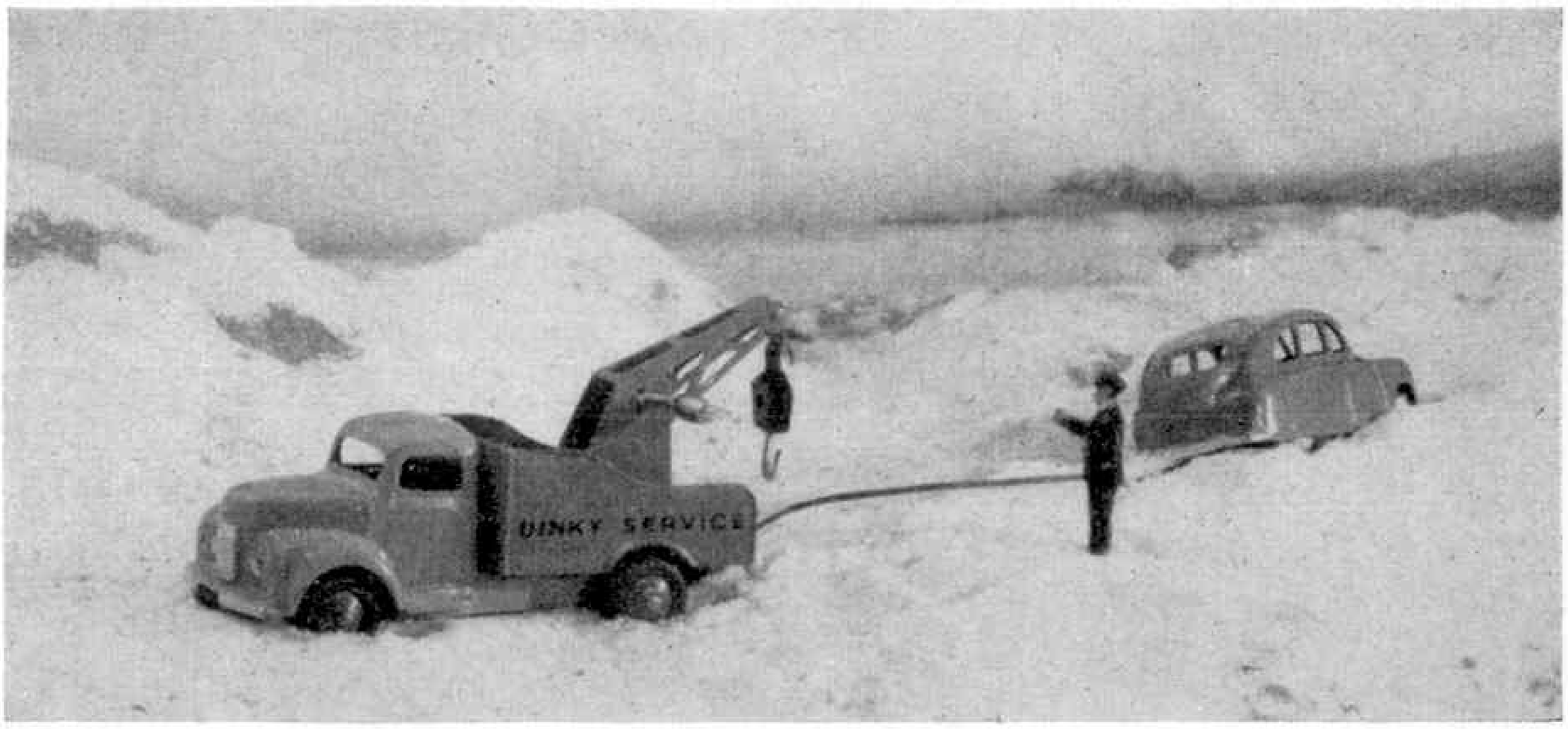


Everything well under control! The extending ladder of the Turntable Fire Escape has been used to gain access to the roof of a large hotel, where a fireman is directing his hose on the seat of the blaze.

still linger on although the main cause of the excitement is now over.

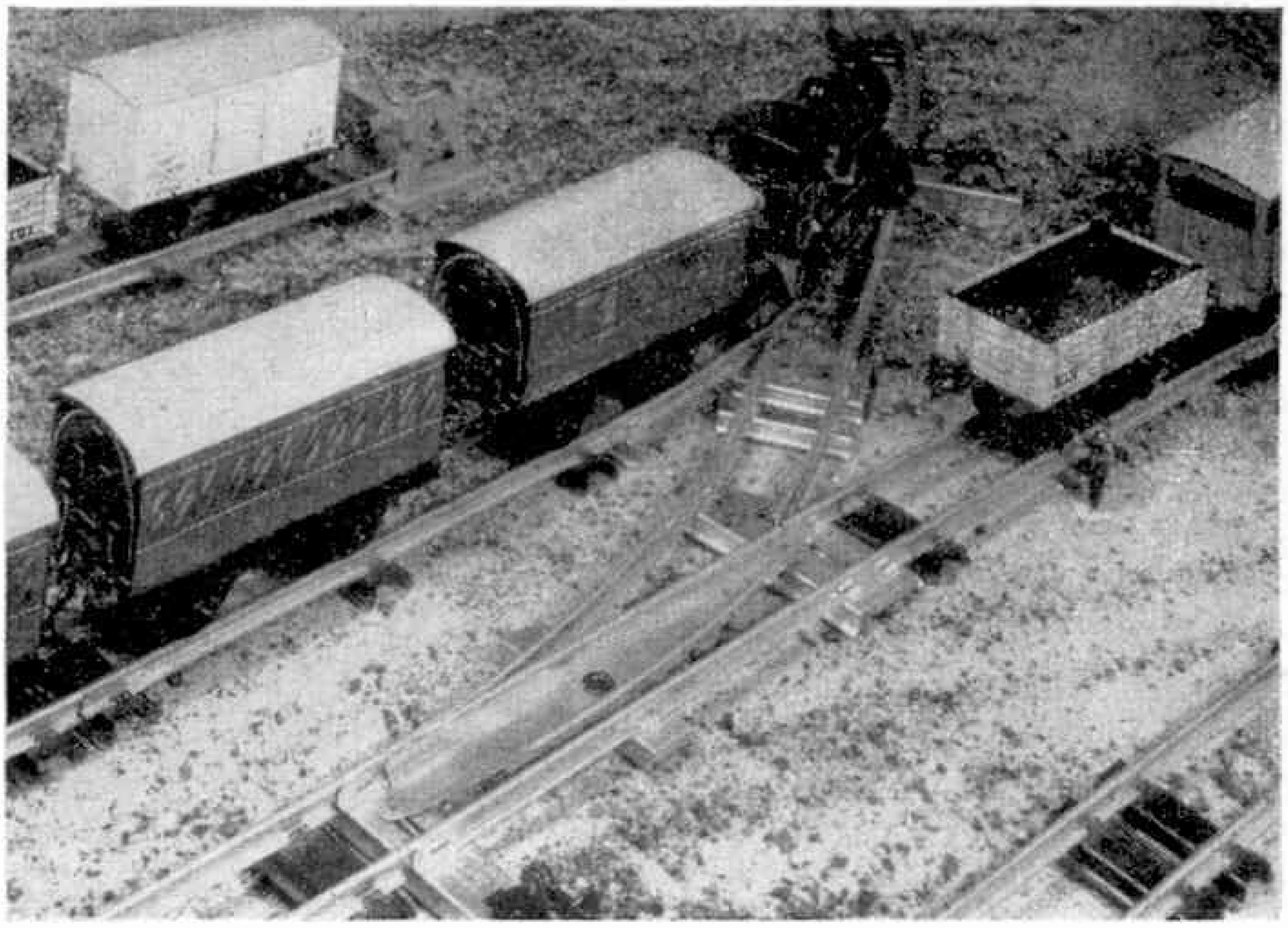
Last month, if you remember, I concluded my chat with you with a reference to the possibilities of snow scenes in Dinky Toys layouts. As I mentioned, these are very easy to arrange and I am quite sure that any Dinky Toys owner who wants to try his hand, will have no difficulty at all in making up a really attractive and realistic setting. Take a look at my last picture, on this page, and you will see what I mean. The only ingredients in this wild and stormy landscape are a few wood blocks, or boxes of various sizes, a good supply of crushed rock salt and a large piece of muslin or butter cloth. Lay the blocks or boxes in irregular formation on a baseboard, spread the muslin over them, add a generous sprinkling of salt—and hey presto—you will have a snow scene realistic enough to make you shiver!

Try it out for yourself and let me know how you get along. I shall be delighted to hear from you.



The joys of winter motoring! A Dinky Toys Breakdown Lorry (No. 430) hauling a car back on to a snow-covered moorland road after it had skidded into a snowdrift.

"Tommy Dodd" writes about



Rail Rules

IT is some time since we had a talk about track. Track of course includes the Rails, Points, Crossings and such items as Buffer Stops, which necessarily form part of the rail system. You cannot have a railway without rails, but I am afraid that many of us do tend to take the track more or less for granted. So we do not worry about it a lot until we have troubles like derailments or something similar.

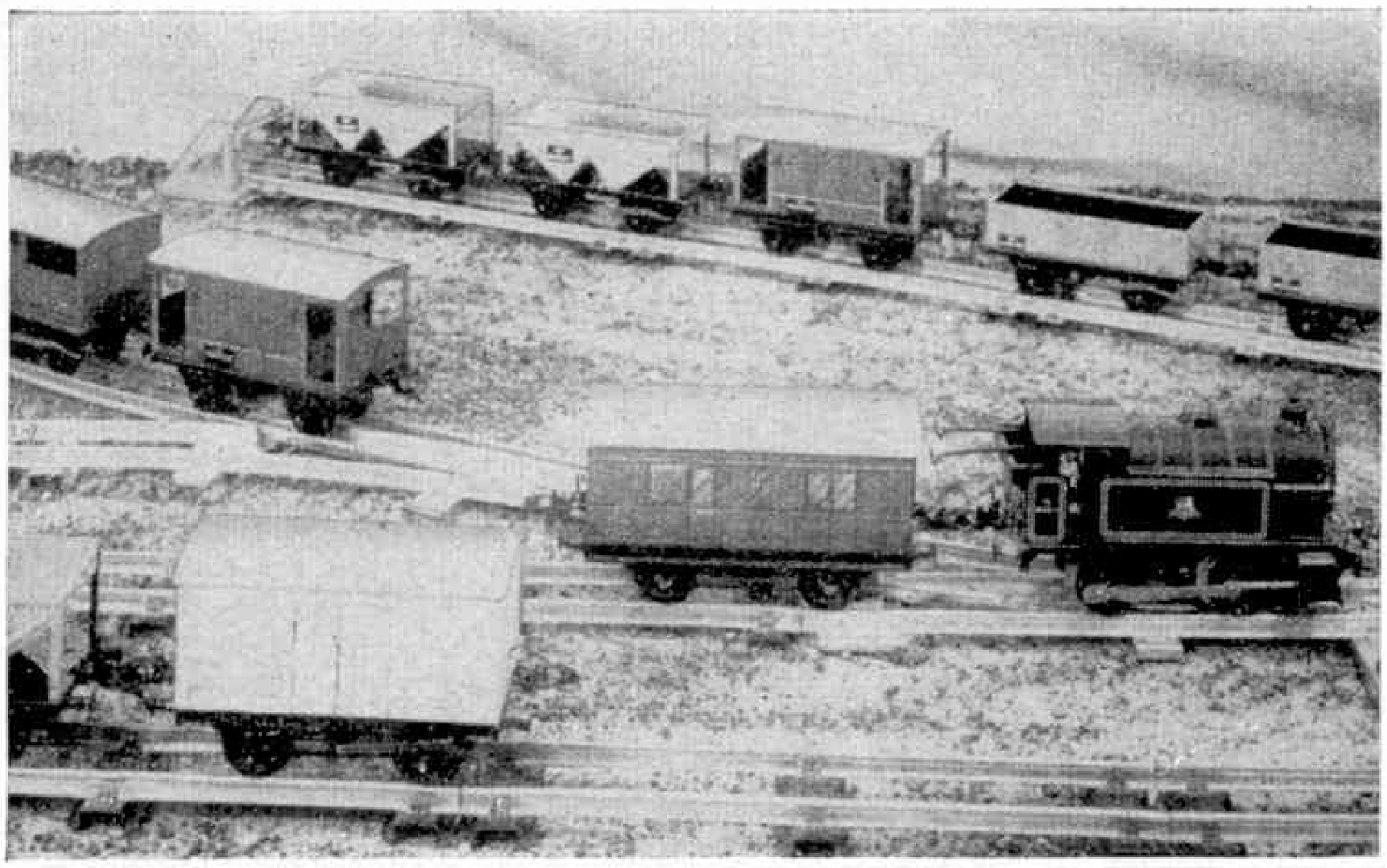
Really this is a pity, because a good track is the foundation of any railway, and as I told you last month the condition of the track has a lot to do with the performance that you can obtain from your engine and trains generally. A good level base for the railway is necessary, but this requirement is apt to be neglected by some Hornby railwaymen. Perhaps they have their rails on the floor, where they are subject to changes in level because of things like mats and so on. You cannot expect to be able to move these about very much, so try to choose a site for the line where a plain uninterrupted course is possible.

There are a lot of floor railways, I know, but whenever possible Hornby engineers endeavour to provide a baseboard, a portable one perhaps, or a permanent one if space permits. There is an interesting story by a Hornby railway owner on the development of his baseboard system on page 104 of this issue. I am sure a lot of you would like to build up your railways in the same way.

Care of the track is important, whether the Rails are screwed down to a board or whether they are simply put down on the floor or elsewhere when running is to be carried out. Joining the Rails together is a fairly simple business, but separating them when running is over has to be carried out carefully. There is a tendency, especially among younger Hornby railwaymen, to "waggle" the Rails from side to side. This tends to open out the rail ends and then the rail connecting pins do not fit as tightly as they should and rough running at joints will occur. A firm straight pull is required to separate the Rails, once you have removed the Rail Connecting Plates from the sleepers at the rail joints.

These Plates are an important part of the Hornby railway equipment, especially on layouts that are not arranged with a

Above is shown a Hornby Tank Locomotive with a train of No. 41 Passenger stock. Left Hand and Right Hand Points are used here, forming a connection between the yard and the running track.



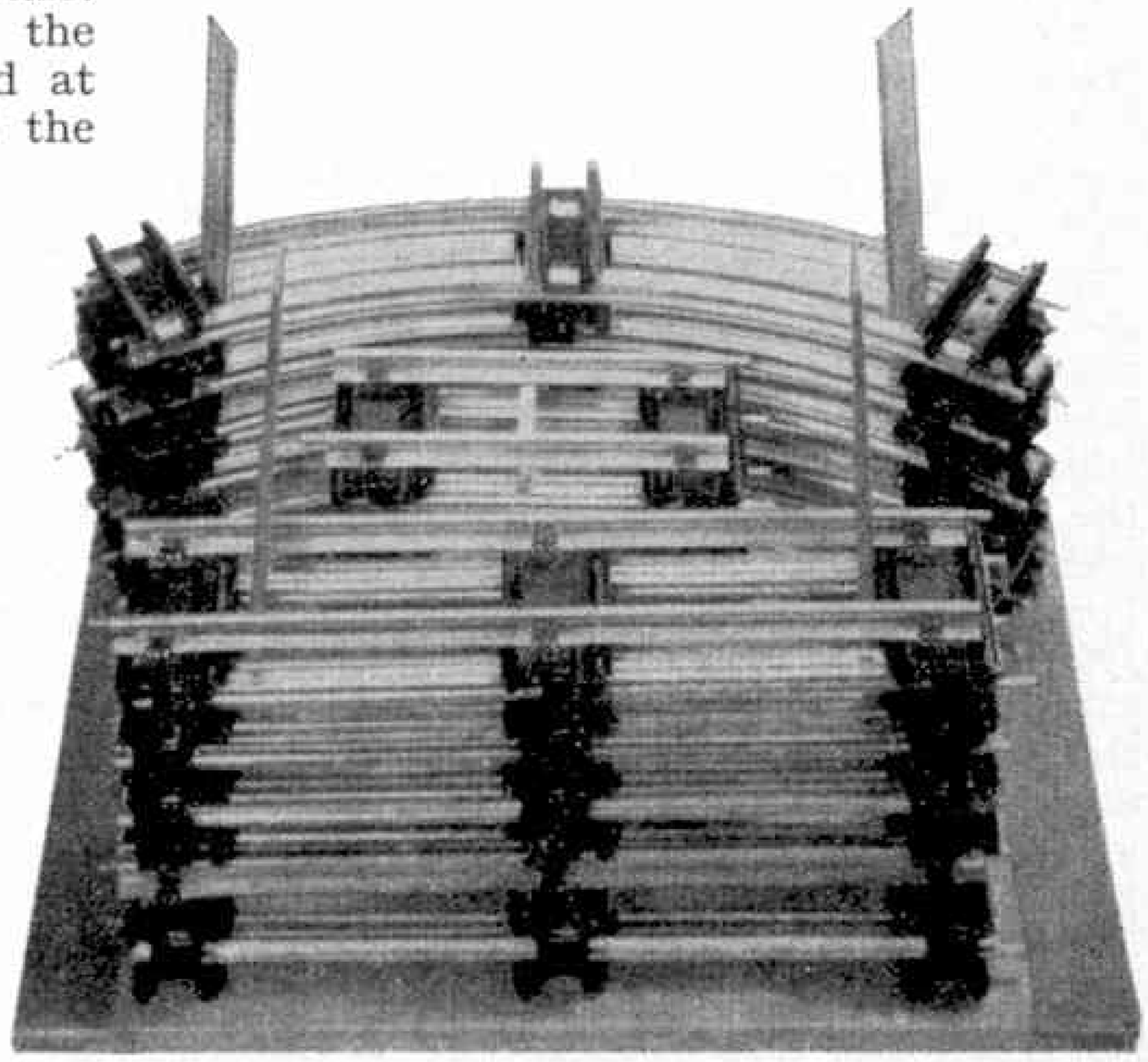
Here is a general yard scene, with Rails, Points and a Buffer Stop. Shunting operations are in progress.

baseboard. They lock together the end sleepers of adjacent pieces of rail and so prevent any tendency for the Rails to come apart, as they might do as the result of train running if there were no Plates. On baseboard layouts they are not really necessary and can be omitted because the Rails are screwed down, but some owners with baseboards prefer to use them anyway, as they do keep the rails well joined up while the business of screwing down is going on. Don't forget that you should not screw the Rails down too tightly. The track should be just free to move vertically, but only just. If screwed down too tightly, rather hard running will result.

Another track part that is important from the joining point of view is the Points Connecting Clip. This is used at the facing end of Points, that is at the end where the Point lever is. This lever is mounted on a sleeper of special construction, which makes it impossible to use the standard Rail Connecting Plate here, the Points Connecting Clip being used instead.

Care of the track in service will be repaid by smooth satisfactory running, so do not forget to examine the rails from time to time, even if they are screwed down on the baseboard. You should check the gauge now and again, particularly at the rail joints, using the back of the handle of the engine key. Make sure that the switch rails of Points line up properly with the fixed rails in either position, for the straight run or for the curve. When using Points you should of course be sure to move the Point lever to the full extent of its travel.

A problem that can arise with temporary systems is the accommodation of rails when not in use. One way of solving it is shown below. This ingenious method of stacking rails was devised by Mrs. Margaret Bryant, of Horsham, for the benefit of her grandson. The upright "pegs," glued into slots in the base, are located so that Straight and Curved Rails respectively are simply placed over them.



What is it? An effective rail stacking arrangement for Hornby Rails made by Mrs. Margaret Bryant, Horsham, Sussex.

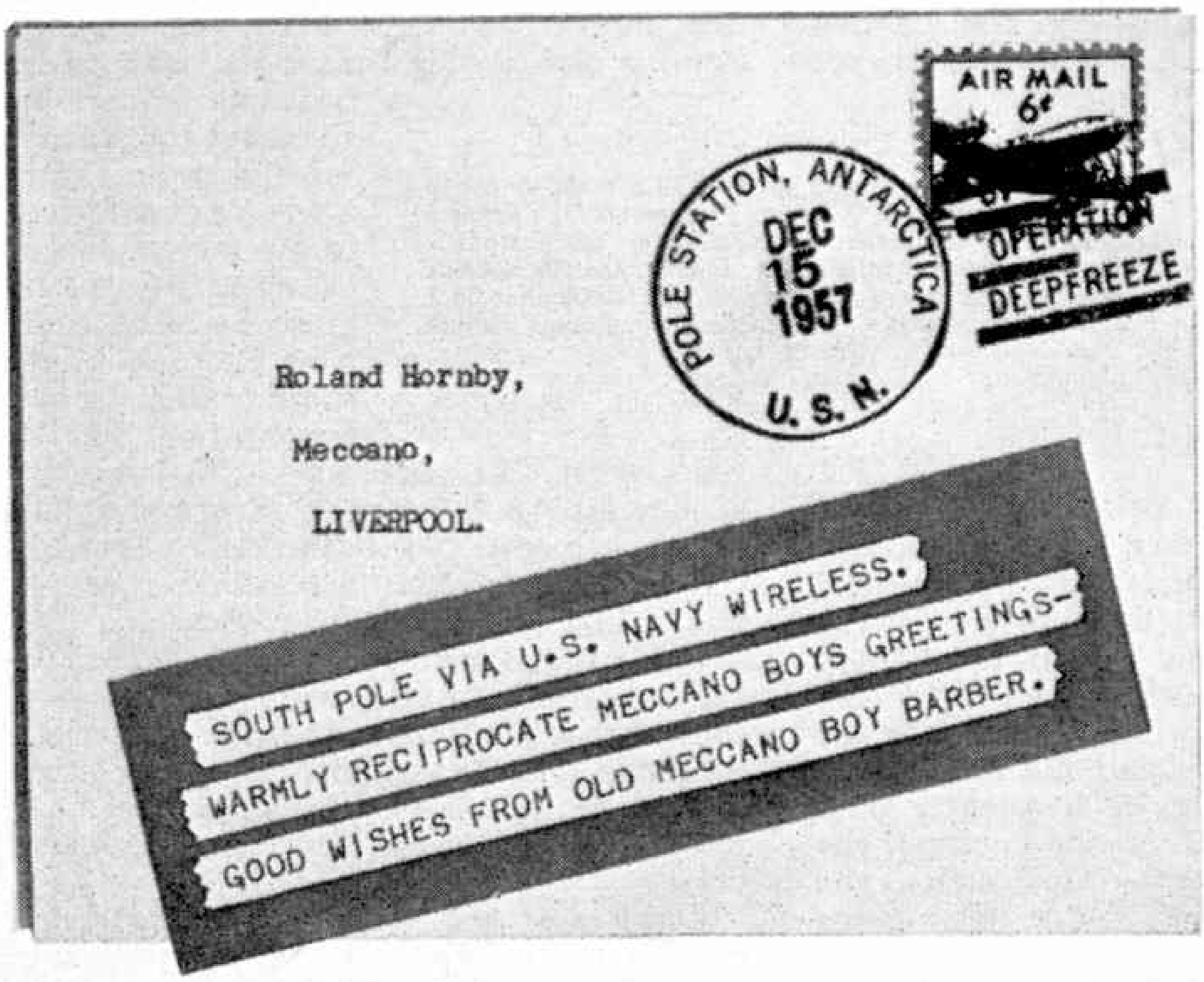
Of General Interest

WHAT finer sight is there than that of a ship in full sail? This thought occurred to me when I first saw the photograph reproduced alongside, which shows the Spanish naval training barque *Galatea* leaving Dublin, bound for the Canary Islands, after visiting that port in September 1954.

The photograph was submitted by H. B. Knott, Blackrock, County Dublin, who added some notes on this very interesting vessel. She started life under the name *Islamount*, and took part in the Australian grain service of a Liverpool firm.

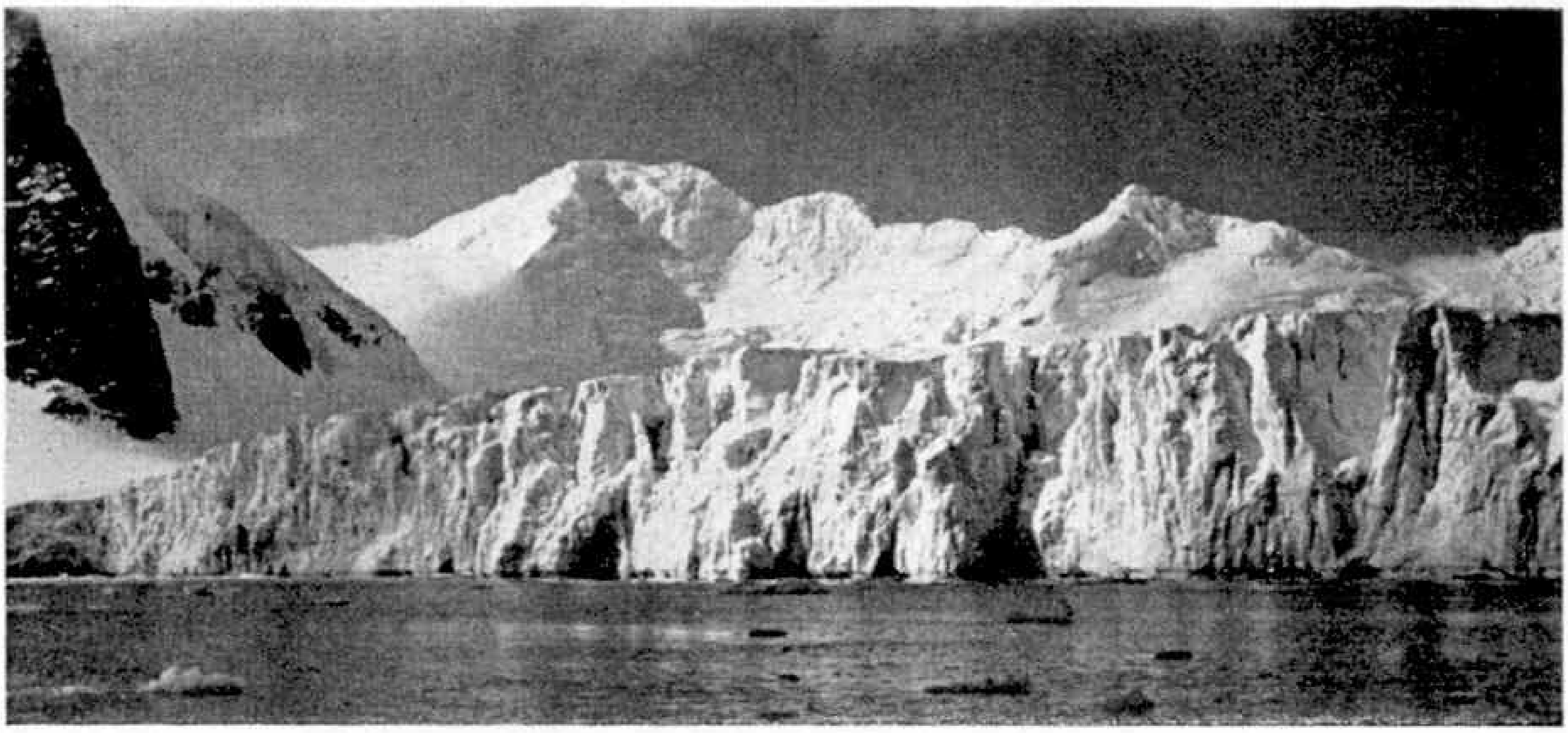
The Spanish naval training ship "Galatea" leaving Dublin. Photograph by H. B. Knott, Blackrock.

The *Galatea* was sold in 1922 to the Spanish Naval authorities, who converted her for training ratings. She is provided with auxiliary motor power in the form of twin Swedish Atlas diesels, of 450 b.h.p. each.



Greetings from the South Pole.

In the lower illustration is a message from the South Pole to all Meccano Boys. How many men of Operation Deepfreeze at the South Pole are old Meccano boys? It would be interesting to know. One of them is *Daily Mail* reporter Noel Barber, famous for his much publicised flight to the Pole at the end of last year. He sends his greetings to you all in the telegram reproduced here.



Ice Caps and Rivers

Why Glaciers are Important to Us

By Eric Ford

TUCKED away in the remote corners of the Earth, often in the most inaccessible places, the world's glaciers may sometimes appear to be no more than objects of tourist curiosity or mountaineering endeavour. In fact glaciers, which cover something like one-ninth of the Earth's land surface, are of great importance to us, for changes in the glacial regions can reduce the size of continents, increase the availability of mineral deposits and change rainfall patterns responsible for the siting of the present arid and verdant areas.

This explains why so much attention is being paid to glaciers by the nations taking part in the International Geophysical Year. Scientists want to know how much ice is in storage, how fast it is melting, whether continued melting will alter the Earth's climate and what lies beneath the great icefields of Greenland and Antarctica.

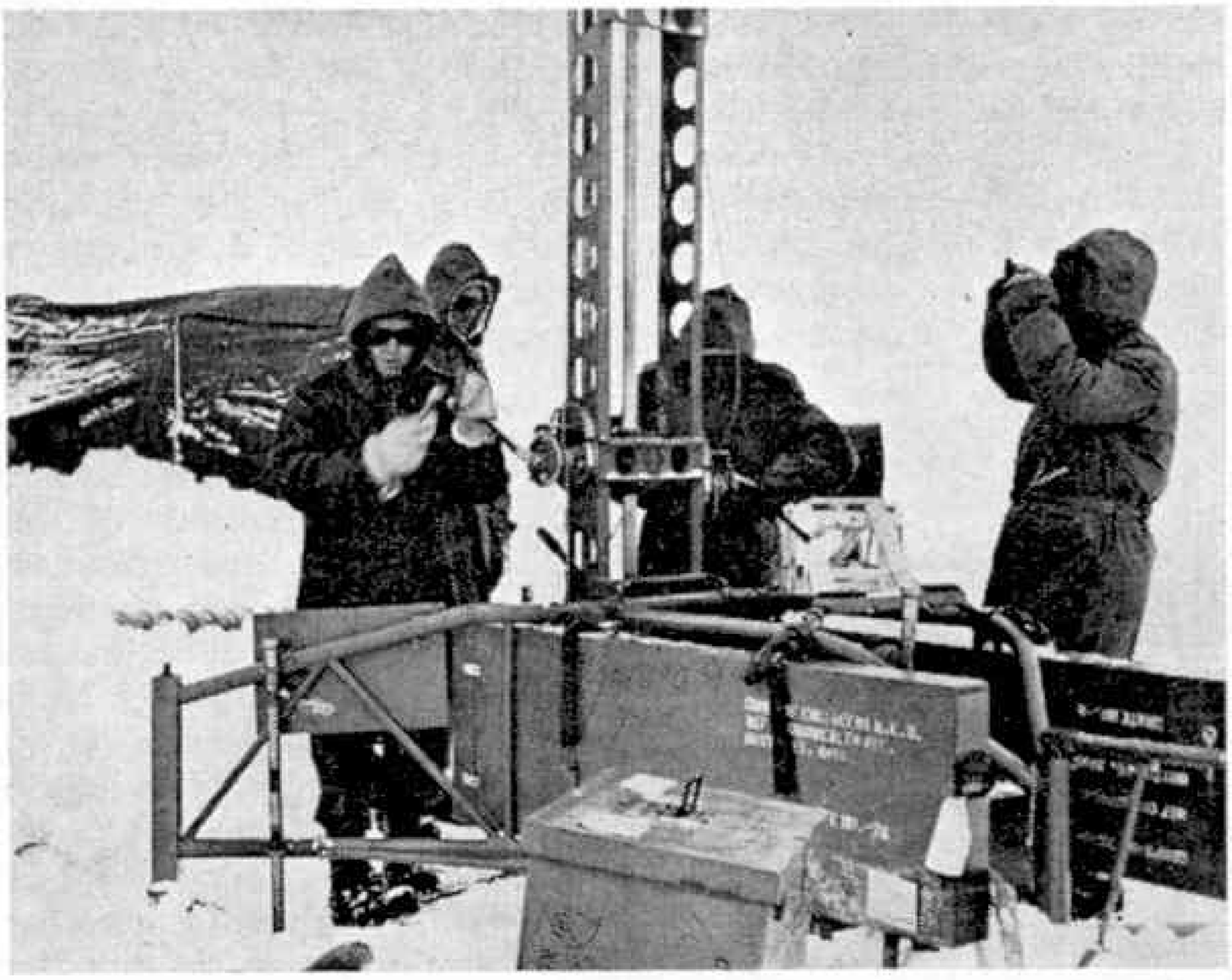
Glaciers occur far more frequently than is perhaps realised. Everyone knows of the magnificent glaciers of the Alps, such as the famous Rhone Glacier, but it may come as a surprise to learn that there are glaciers on Kilimanjaro, 19,340 feet, which is situated in Tanganyika, only 200 miles from the Equator. Alaska can boast of the remarkable Malaspina Glacier, which has an area of 1,500 square miles and, on its outer edges, supports dense pine forests.

On the other hand, one of the Earth's coldest regions, the permanently frozen area in Northern Siberia between Novaya Zemlya and Bering Strait, has no glaciers because snowfalls there are too scanty, for low temperature alone is not sufficient to produce a glacier. Winter snowfall must be sufficiently heavy so that summer melting and evaporation fail to remove it all, leaving a balance to accumulate year by year. Successive falls of snow press down on those beneath, converting them first into granular ice and finally into a solid, compact mass.

The illustration at the head of the page shows a typical Antarctic scene. It represents Glacier Mountain, in South Georgia, and the ice cliff that falls from it to the sea. This is now the subject of a glacier survey that began in December last and will continue until April. Polar Photos photograph.

The process can perhaps be likened to the formation of a snowball by compressing snow between the hands until it forms a solid ball. As the weight of the snow layers increases the mass begins to move slowly in the direction of the slope and a glacier is born.

Sometimes the glacier is formed in a mountain valley, as in Switzerland, Norway, the Rocky Mountains and other places, moving slowly downward until its



Extracting cores of ice from deep in a Greenland glacier, with samples of the underlying earth. U.S. Information Service photograph.

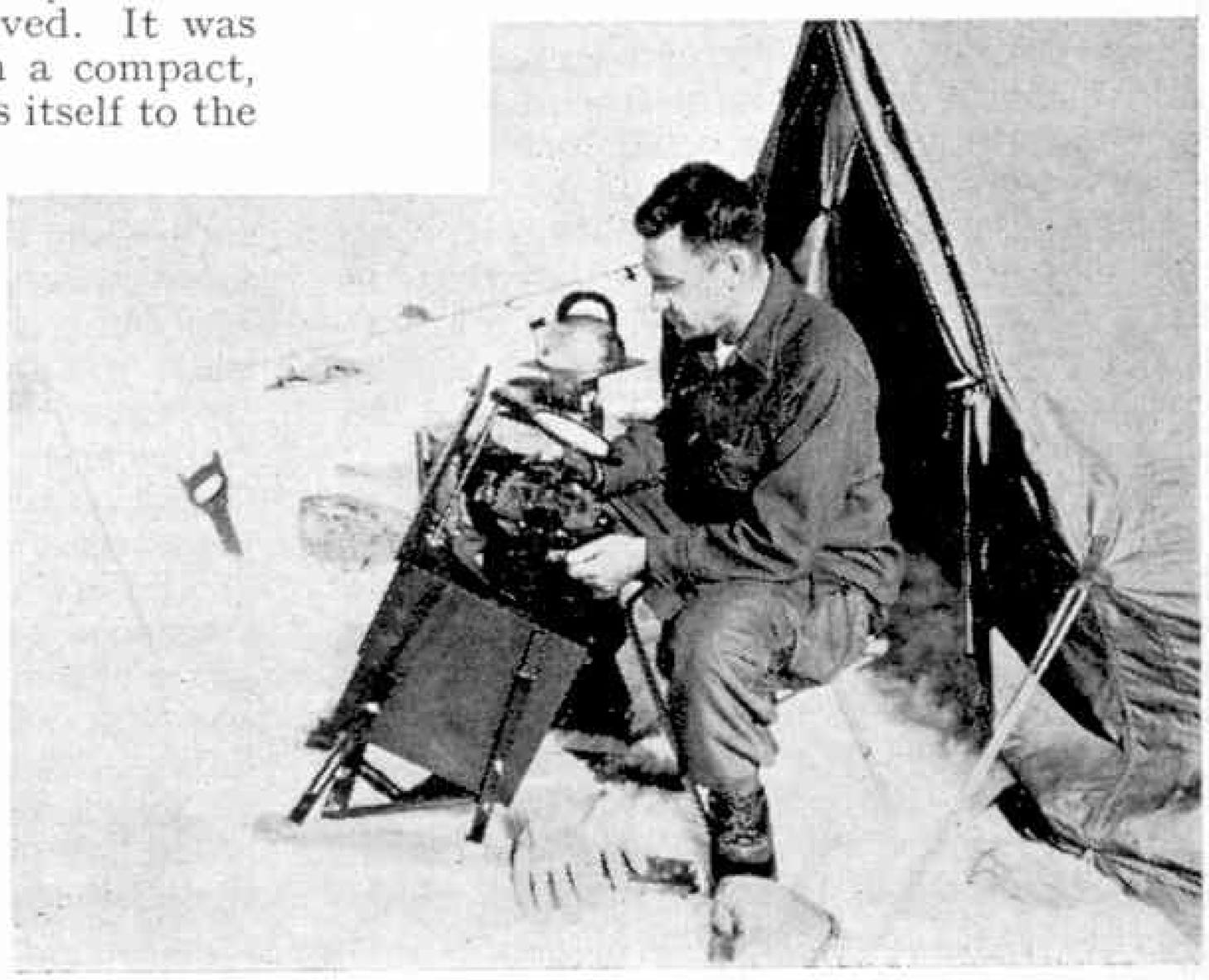
forward edge reaches a warmer area and melts. Elsewhere, huge continental glaciers are formed as in Greenland, where the ice sheet occupies half a million square miles, or in Antarctica, which has an ice cap seven times the size of that of Greenland. In these areas, the ice creeps slowly outward towards the margins, eventually releasing huge blocks of solid ice into the surrounding seas as icebergs.

Back in the far off Ice Age, continental glaciers of this type covered great areas of North America and Europe. At that time, too, perhaps 25,000 years ago, ice sheets may have existed in South America, South Africa and Australasia.

For a long time, people were puzzled to understand how a glacier moved. It was clear that it did not travel in a compact, unalterable shape, for it adapts itself to the shape of the terrain over which it passes. It is now known that the explanation lies in what is called the principle of regelation. This can perhaps be simply explained by saying that when ice is under pressure it thaws, only to freeze again when the pressure is relaxed. It follows, therefore, that when the mass of a glacier presses against some obstacle, such as a bend in a valley, the pressure at that point causes the ice to melt, assume the shape of the land and then freeze in its new shape.

As this is a continual process, the effect is to make a glacier resemble a very slowly flowing river. And like a river, a glacier flows faster at the centre than at the sides, as can easily be proved by the time-honoured method of driving a row of stakes into a glacier across its width. Then, after a time, the centre stakes will be seen to have travelled farther downward than those at the edges. Scientists are not yet sure about the speed of flow at different points inside a glacier, but here again, as in the case of a river, it is thought that a glacier flows faster at the surface than in the interior.

As they move on their inexorable way, glaciers pick up huge boulders that become embedded in the ice mass. They act as highly efficient rasps and scribing tools on the ground beneath. Evidence of this action can be traced in many parts of the world and enables geologists to trace the movement of glaciers in the Ice Ages.



A scientist makes his daily meteorological observations and measurements on the Greenland ice cap, where the temperature often sinks to 85 deg. F. below zero. U.S. Information Service photograph.

When a glacier melts, the rocks and other materials that it has carried along with it are deposited, often to the wonderment of geographers centuries later, when a rock or type of soil is found far from its usual home. A famous example of this is Shelter Rock, which now rests in the Whitney Estate, Manhasset, Long Island, but has been traced to the Highlands of the Hudson River a hundred miles away, whence it was given a ride on a glacier during the North American Ice Age, thousands of years ago.

Moraines, or lines of earth and stones stretched out along a Greenland glacier demonstrate the flow of the ice. Polar Photos photograph.

Today many of the world's glaciers are known to be shrinking, including even the mighty Great Ross Barrier in the Antarctic. Its sheer ice cliffs, rising more than 100 feet above the sea, have retreated many miles since Captain James Clarke Ross discovered them in 1841. On the other hand, recent observations on the Greenland ice cap have revealed that it is at least holding its own, although Russian scientists report that the huge ice cap on the Tien Shan mountains, which straddle the Soviet-Chinese border, is retreating at the rate of a mile in a few years.

On balance, it is thought that the world's glaciers are tending to shrink, which leads to some fascinating speculations as to the effects of the change upon the level of the seas of the world. It has been calculated, for example, that at the time of the Ice Age the sea level was about 300 feet lower than it is today. Others have estimated that if the world's present glacial ice were suddenly to melt, the level of the oceans would rise by about 180 feet, so that the whole of London and New York, and many more places besides, would be under water.

At the present moment, however, it is thought that the level of the oceans may be rising by no more than 2½ inches a century. This is unlikely to endanger anyone's favourite seaside holiday resort for a very long time to come!

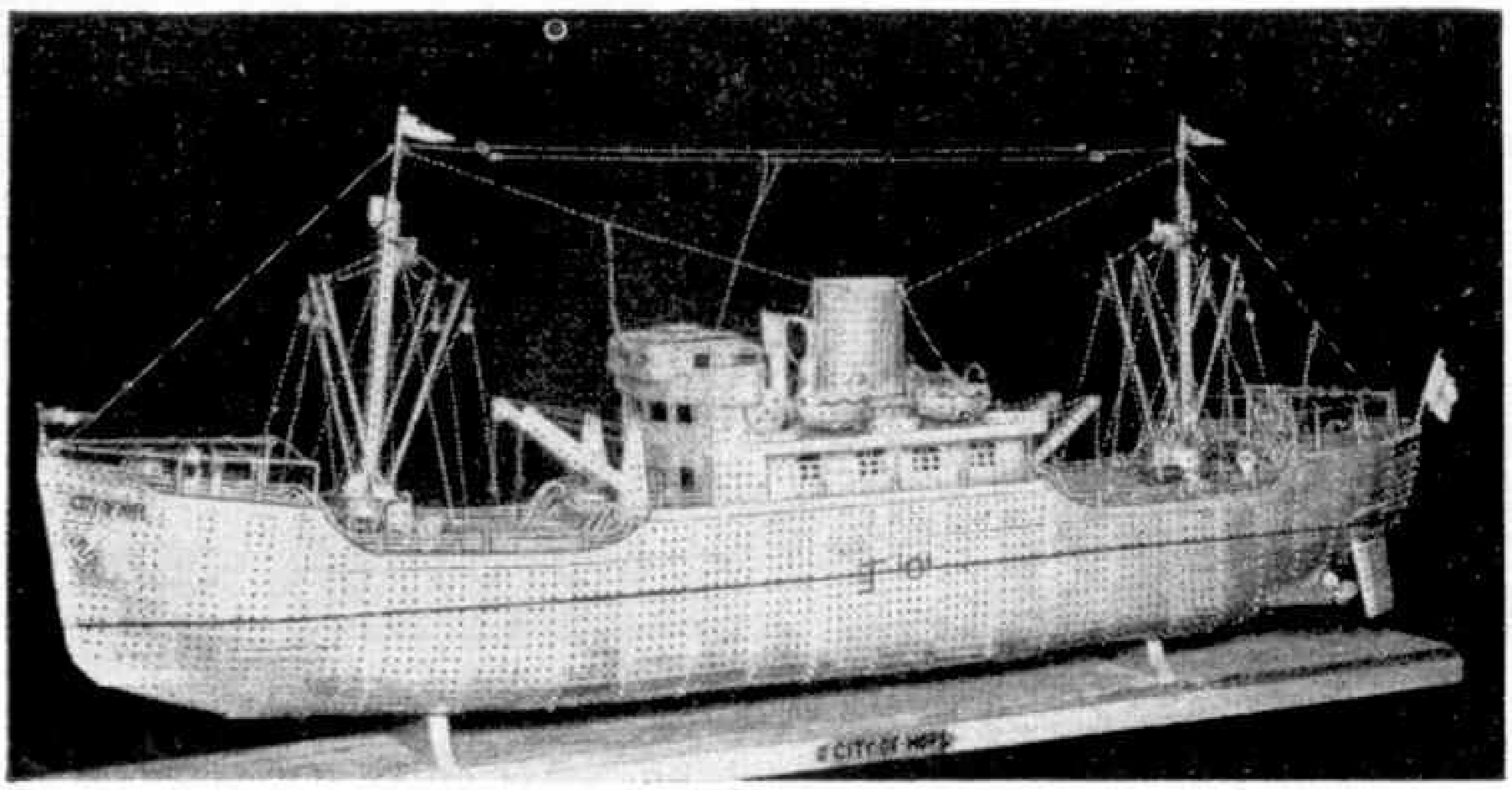
Various estimates have been made of the amount of water contained in glaciers, and some calculations put the figure as high as 1.7 per cent. of all the water on the earth. This, however, may well be considerably wide of the mark, for nobody yet knows the amount of ice locked up in the form of glaciers, particularly in the Greenland and Antarctic ice fields.

Using the seismic sounding methods developed in oil prospecting, ice thicknesses of more than 8,000 feet, or about a mile and a half, have been discovered in Greenland, while even greater thicknesses exist in the Antarctic. Former theories that Greenland is a huge upraised land mass with a layer of ice on top are now discounted and it may well be that the highest mountains in those parts are mountains of ice.

Similarly, recent theories suggest that the land mass of Antarctica may really be in the form of a huge bowl, the rim of which is comprised of a rugged coastal ring of rock while the centre is filled with a glacier more massive than any previously known. Problems associated with this huge ice sheet will be examined by members of the six expeditions now in the Antarctic in connection with the International Geophysical Year, all of which are making measurements of ice depth.

Glaciers vary considerably in regard to the speed at which they move. Some rush along at a speed of 60 feet a day during the summer, while others, such as the Mer de Glace in the French Alps, crawl down their valleys at a bare two feet during the course of the 24 hours. The world's largest glacier, the Beardmore Glacier of Antarctica,

(Continued on page 110)



This beautifully proportioned and highly detailed merchant ship was built some years ago by J. Willems, Antwerp, Belgium. It is one of the finest models of its type ever illustrated in the "M.M."

Prizes for M.M. Readers

A Competition for Meccano Models of Any Kind

IN the January issue of the *M.M.* we gave the first details of a new competition for Meccano model-builders that is now open for entries, and for the benefit of any readers who did not see the original announcement we are repeating the main details here.

The Competition is open to readers of all ages living in any part of the world, and it follows the usual form for *M.M.* General Competitions. The models entered can be of any kind and you can use just as many parts as you like to build your model. There are absolutely no restrictions on the subjects that can be chosen for models, or on the sizes of the Outfits used to build them. The main condition is that the actual construction of each model must be the competitor's own, unaided work. Entries must be posted in time to reach Liverpool not later than 30th April next.

At this time of the year there are many newcomers to the Meccano hobby, and we hope all of them will send in entries for this Competition. Don't refrain because you think your model-building experience limited, or your Outfit too small. These ideas are mistaken. What you should keep in mind is first, that the main thing is to choose a suitable subject you can make really well with the parts you have available, so that you can build an attractive, realistic and sturdy model, and second that age is taken into consideration and there will be a special section for the younger model-builder. A small, well-designed model will have just as much chance of success as a large and complicated structure, as the judges will make allowance for the parts available to the builders when they examine the entries.

Naturally we do not expect very young model-builders to compete against older and more experienced Meccano enthusiasts, and for this reason entries will be divided into two Sections. Section A is for competitors under twelve years of age on 30th April next, while entries from competitors aged twelve or over on that date will be placed in Section B. Details of the prizes to be awarded for the best models submitted in each Section are given in the panel at the foot of this page.

The actual model must not be sent. Entries should consist of photographs or sketches of the models, and each competitor's age, name and address must be written clearly on each print or sheet of paper submitted.

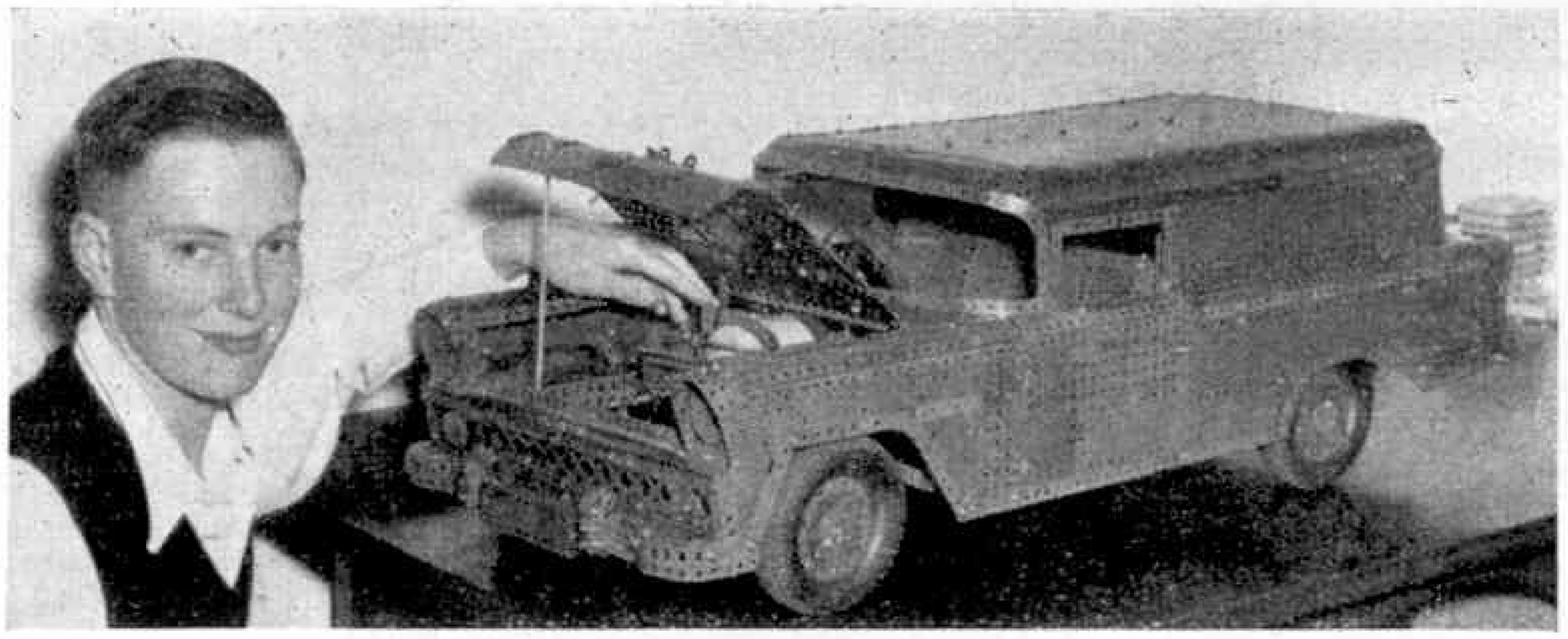
Prize-winning entries are not returnable, but unsuccessful entries will be returned if a suitable stamped addressed envelope is sent with the drawings or photographs.

THE PRIZES

The following prizes will be awarded in each of the Sections A and B.

	£	s.	d.
First Prize, Cheque for	4	4	0
Second Prize, Cheque for	2	2	0
Third Prize, Cheque for	1	1	0
Ten prizes, each of		10	0
Ten prizes, each of		5	0

Closing Date for Entries: 30th April, 1958.



Mr. P. Hatty, Bulawayo, S. Rhodesia, shows the "under the bonnet" secrets of a fine model Chevrolet Panel Van he built recently. The model is 1/5th of the actual size of the real vehicle and has a fully equipped chassis.

Among the Model-Builders

By "Spanner"

Automatic Reversing Mechanism

Automatic reversing mechanisms seem to have occupied the attentions of many model-builders since I mentioned them in the *M.M.* last year, and several have sent along details of arrangements they have found useful. One of these readers is Mr. A. T. C. Burlinson, Bristol, who sent me sketches of two mechanisms he has used in his models. I have built up one of these mechanisms and a picture of it is reproduced as Fig. 1

The arrangement is very simple but it has certain limitations, chief of which is that the output shaft makes approximately only one revolution before the drive is reversed. This should be sufficient for models of many kinds, however, and of course by using step-up gearing from the output shaft the number of revolutions can be increased.

The driving member of the mechanism is a 1½" Contrate, which is attached by a ½" and a ¾" Bolt to a 57-tooth Gear or Bush Wheel 1 on the input shaft 2. The Contrate is spaced from the Bush Wheel by four Washers on the ½" Bolt and by nuts on the ¾" Bolt, so that it is set at an angle to the output shaft 3. The output shaft carries two Pinions, arranged so that each in turn is engaged by the inclined Contrate as it rotates. The transfer of the drive between the upper and the lower Pinion results in the direction of rotation of the output shaft being reversed.

An Interesting Meccano Novelty

One of my regular correspondents, Mr. H. Taylor, Huddersfield, sent me details of the unusual Meccano model shown in Figs. 2 and 3. The principle of the device is that two rotating members, mounted on a common shaft, are driven slowly and steadily in opposite directions by an Electric Motor. Each rotating member consists of a series of curved arms, and as these rotate they produce patterns of constantly changing design. The effect is increased by illuminating the model, as shown in the pictures, so that the light shines through a screen of white paper

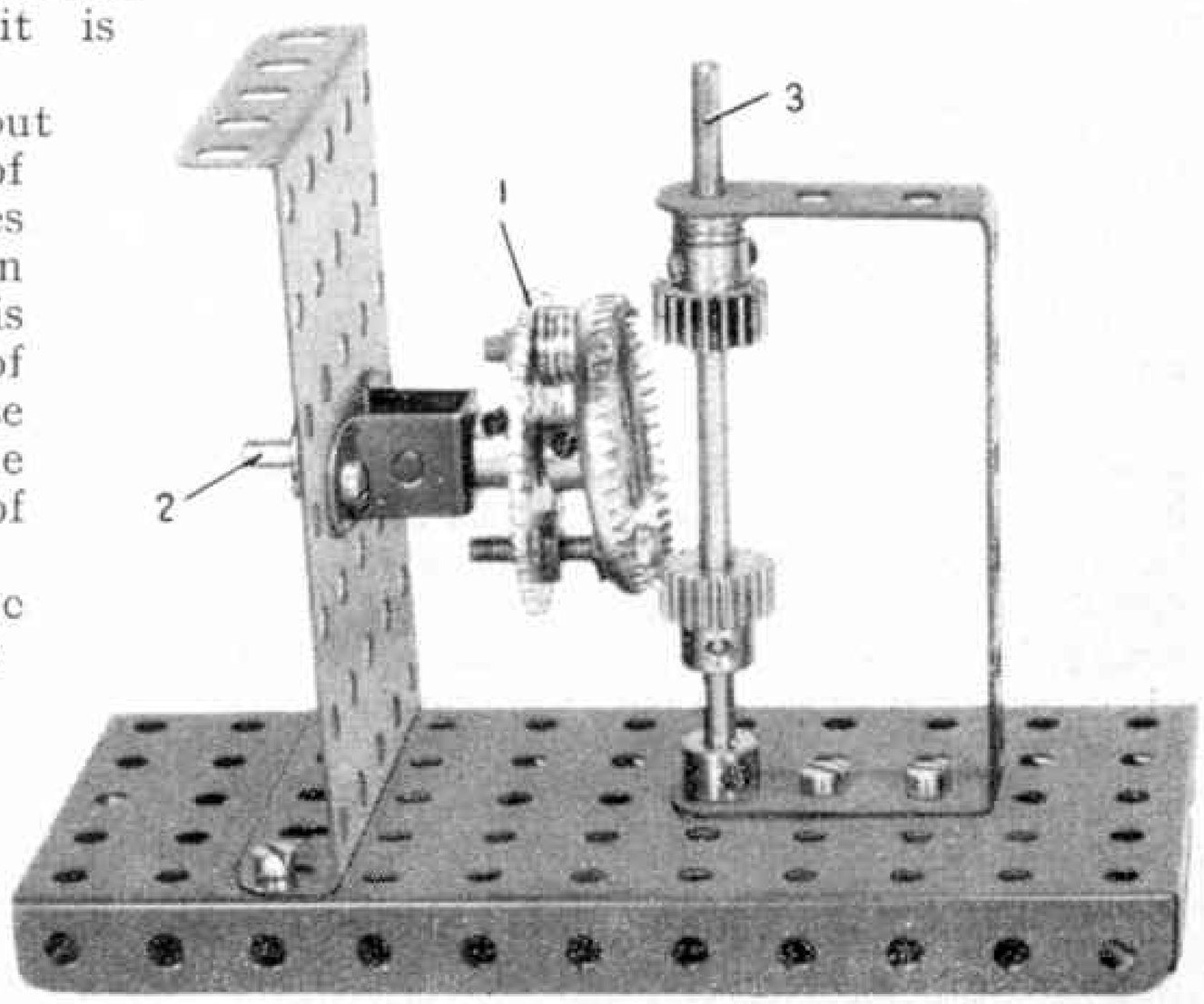


Fig. 1. A novel but practical auto-reversing mechanism designed by Mr. A. T. C. Burlinson, Bristol.

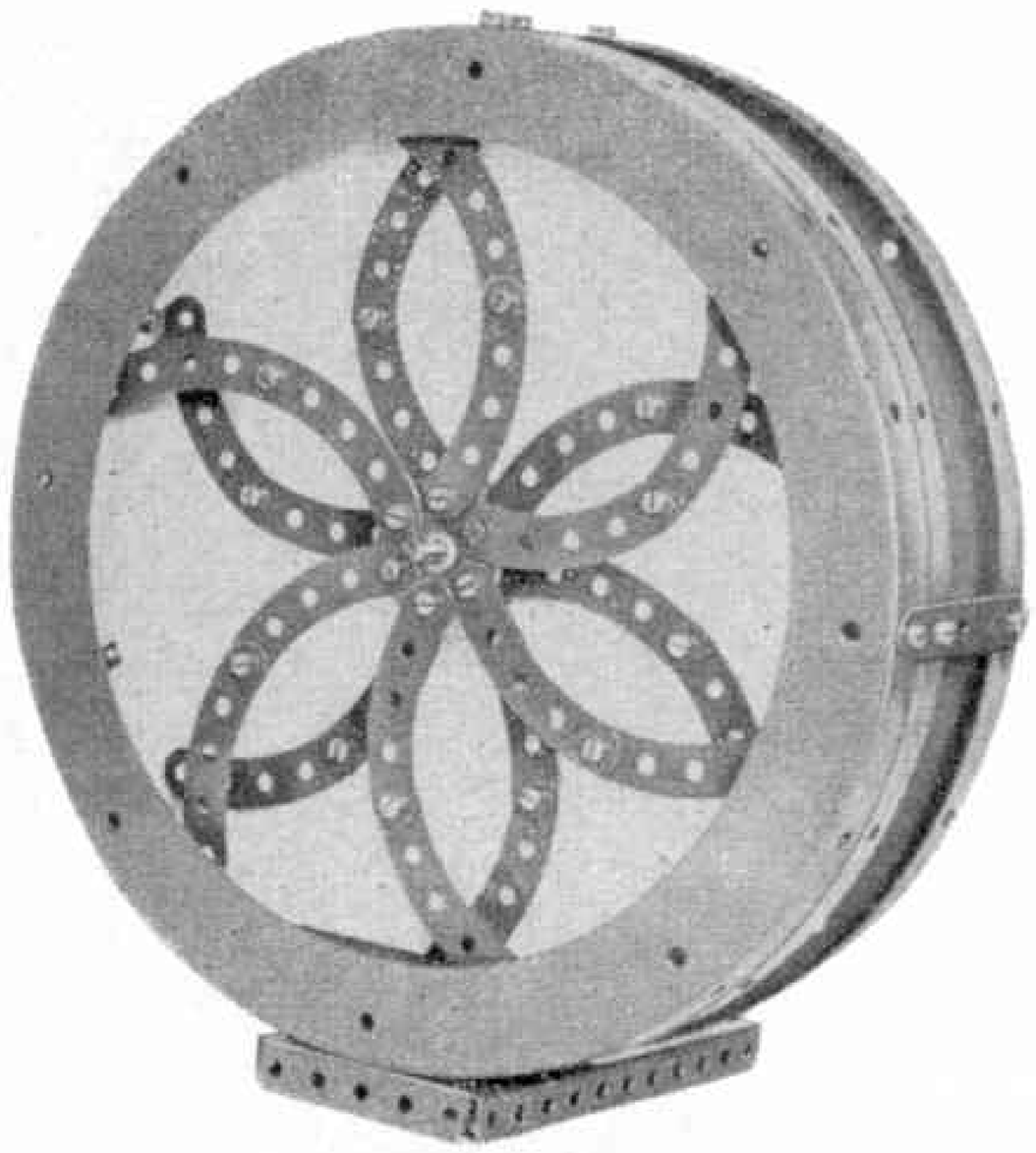


Fig. 2. An interesting novelty, which produces designs of constantly changing pattern.

placed behind the rotating arms.

The frame of the model consists of three $9\frac{7}{8}''$ diameter Flanged Rings bolted to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, and connected by three $2\frac{1}{2}''$ Strips. A $9\frac{1}{2}''$ Strip 1 is fixed across one of the Flanged Rings and to it are fixed two Double Bent Strips. These support the axle for the rotating members. The axle is a 4" Rod fitted with a $\frac{1}{2}''$ Pinion 2 fixed on the Rod, and a 1" Gear 3 free to rotate. A 3" Strip 4 is passed over the Rod and is connected to Strip 1 by a Double Bracket. A $\frac{1}{2}''$ Pinion is mounted freely on a $\frac{3}{4}''$ Bolt attached to Strip 4 by two nuts, and this Pinion engages the Pinion 2 and a $\frac{1}{2}''$ Pinion 5, fixed on a $2\frac{1}{2}''$ Rod. The Rod carries also a 57-tooth Gear and a 1" Gear. The 1" Gear meshes with the Gear 3, and the 57-tooth Gear engages a $\frac{1}{2}''$ Pinion on a 3" Rod that forms the driving shaft.

A Socket Coupling is fitted to the boss of the Gear 3, and a six-hole Bush Wheel is fixed in the Socket Coupling so that the complete assembly is able to rotate freely on the 4" Rod. A second six-hole Bush Wheel is fixed at the end of the Rod but is spaced from the first Bush Wheel by three Washers. The two Bush Wheels carry the rotating arms, each of which consists of two $2\frac{1}{2}''$ Curved Strips.

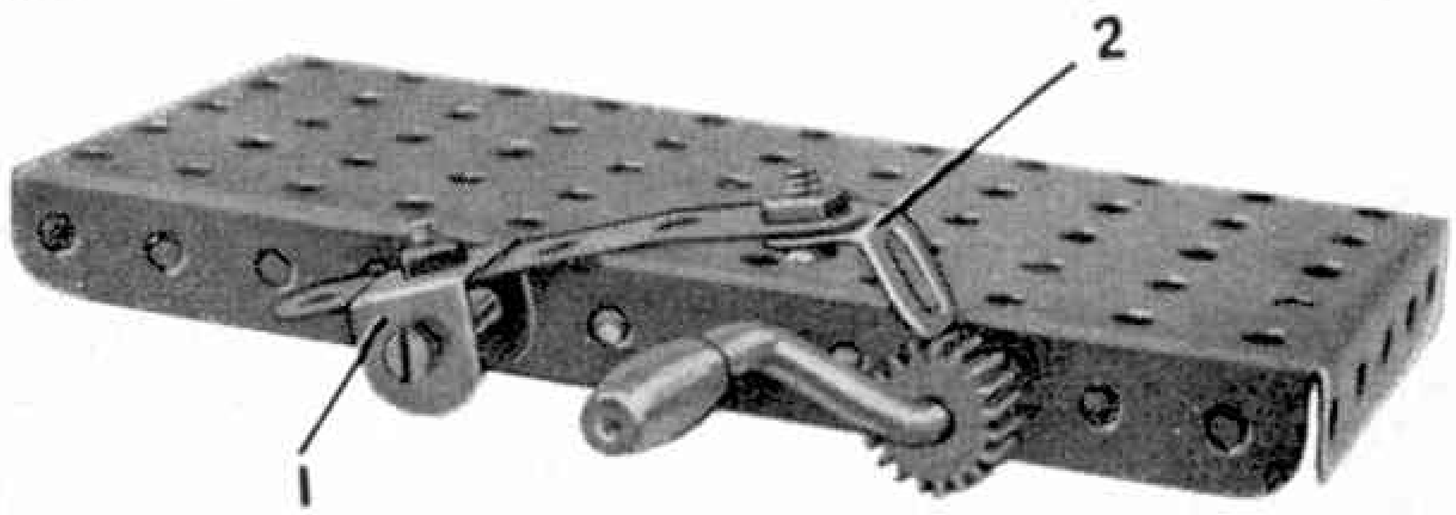


Fig. 4. Young crane-builders will find this a useful pawl and ratchet for controlling hoisting and lowering of the load.

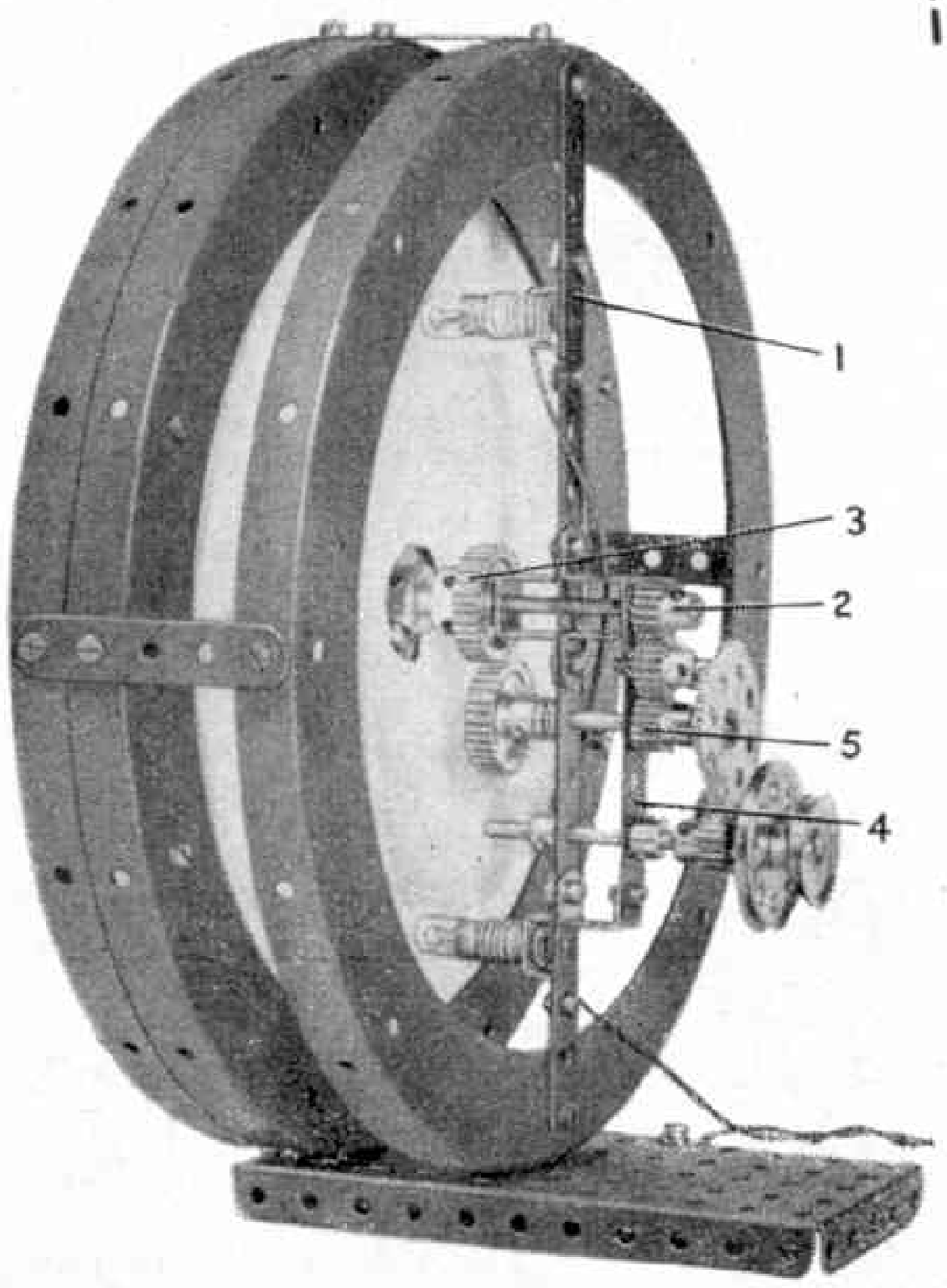


Fig. 3. A rear view of the novelty mechanism shown in Fig. 2.

A sheet of plain white paper is cut to fit inside the centre Flanged Ring and is bolted in place. The lamps are low voltage bulbs screwed into suitable bulb holders, which can be attached to the Strip 1.

To operate the model the bulbs should be connected to a dry battery or a transformer, and an Electric Motor fitted with suitable speed reduction gearing should be coupled to a Pulley on the driving shaft. Mr. Taylor suggests an E20R(S) Electric Motor with a 57:1 reduction ratio, provided by a Worm and a 57-tooth Gear. Variations in the operating speed of the model can be introduced by using Pulleys of different sizes on the driving shaft.

A Simple Pawl and Ratchet for Crane Drums

The easily-assembled arrangement shown in Fig. 4 is a suitable pawl and ratchet

(Continued on page 110)

An Attractive Model Slotting Machine

PROBABLY the best known machine used in engineering is that maid of all work, the lathe, of which there are many different types, and while this machine in its various forms is still the most important there are many other machines, or machine tools, as they are known, specially designed for carrying out certain types of metal cutting and finishing in a quicker and more economical manner than could be done on a lathe. Among these is the planing machine and its close relatives the shaping and slotting machines. It is a machine of the latter type that forms the subject of the fine model shown complete in Fig. 1 on this page.

The base of the model consists of two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates connected by $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates bolted to their flanges. Two $5\frac{1}{2}''$ Angle Girders and two $5\frac{1}{2}''$ Strips bolted to the Plates support two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates that partly fill in the top of the base.

Each side of the column is formed by a $12\frac{1}{2}''$ Angle Girder and a $9\frac{1}{2}''$ Angle Girder

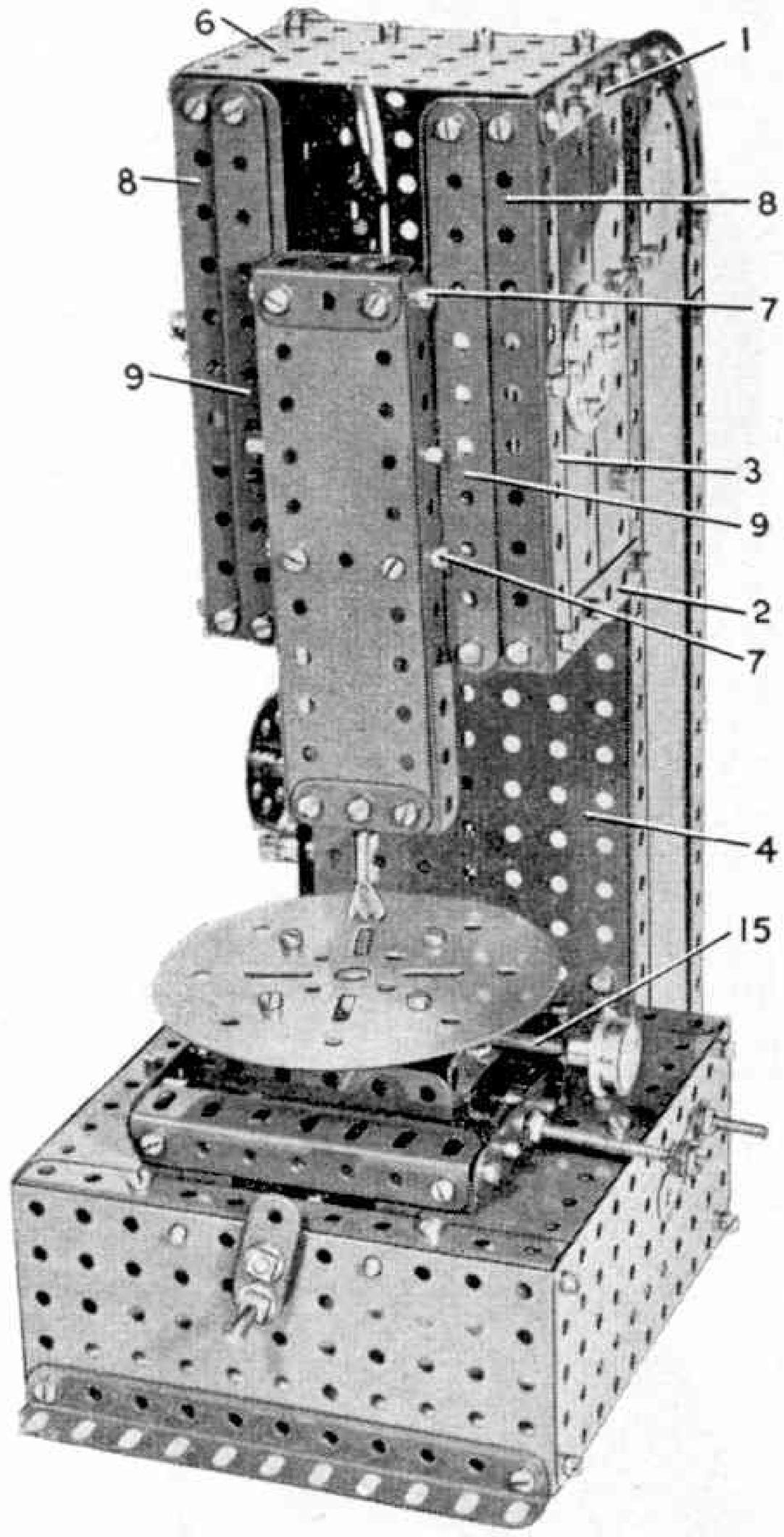


Fig. 1. A model of an engineers' Slotting Machine of the type to be seen in many engineering workshops.

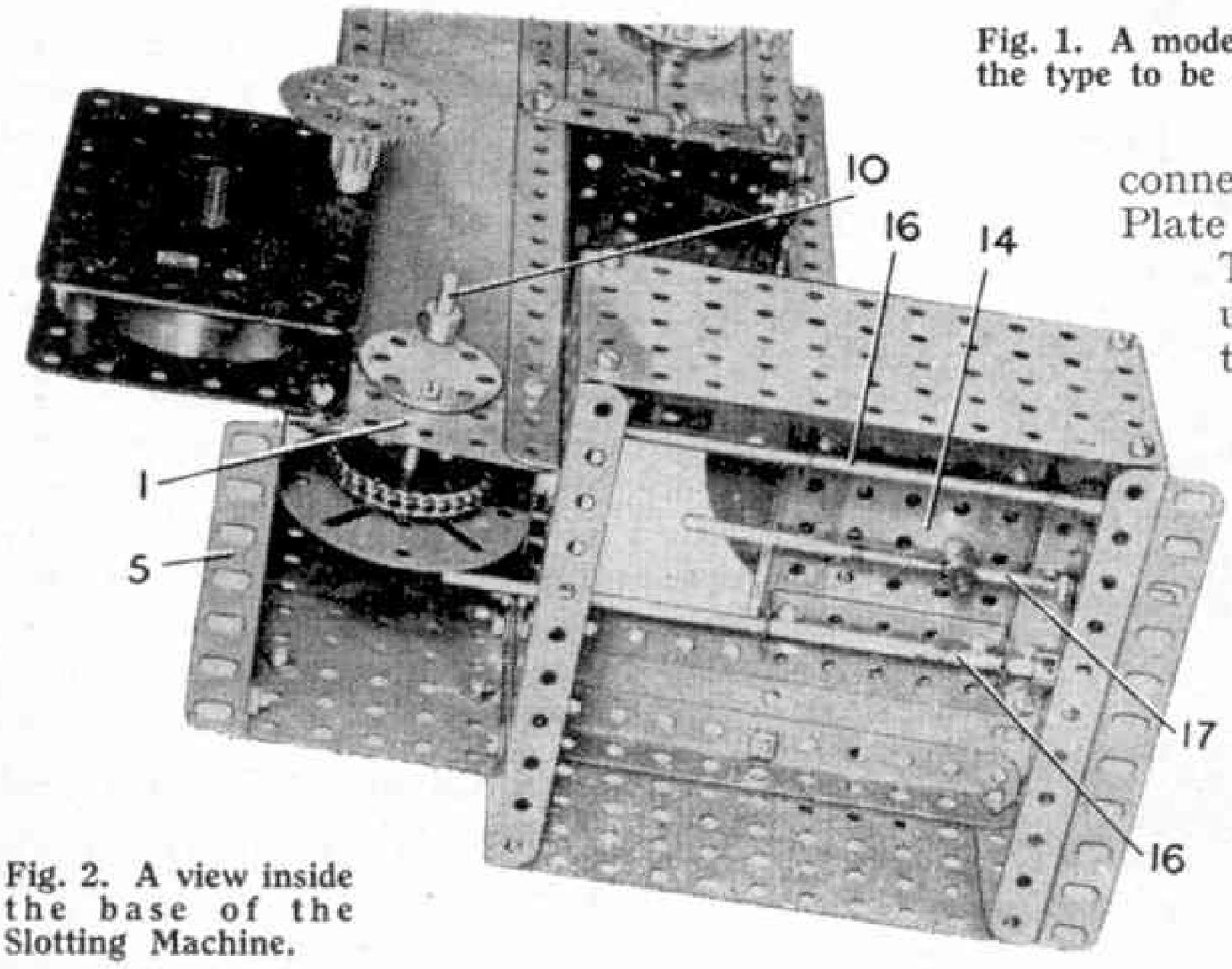


Fig. 2. A view inside the base of the Slotting Machine.

connected by a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 1 and a $9\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plate. The $9\frac{1}{2}''$ Girder is extended upward by a $1\frac{1}{2}''$ Strip, and this is connected to a $3\frac{1}{2}''$ Strip by a 3" Stepped Curved Strip. A $2\frac{1}{2}'' \times 2''$ Triangular Flexible Plate fills in the top of each side.

A 3" Strip 2 is bolted to the $12\frac{1}{2}''$ Girder and is connected to the $3\frac{1}{2}''$ Strip by two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates and a $5\frac{1}{2}''$ Angle Girder 3.

The sides of the column are connected by a $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate 4, a $3\frac{1}{2}''$

Angle Girder 5 and a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 6. Three $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates are curved slightly and are bolted between Plate 6 and a $3\frac{1}{2}''$ Strip fixed to the upper ends of the $9\frac{1}{2}''$ Angle Girders. The column is bolted to the rear of the base.

The sliding ram that carries the cutting tool consists of a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate edged by a $1\frac{1}{2}''$ Angle Girder, a $1\frac{1}{2}''$ Strip and two $5\frac{1}{2}''$ Angle Girders. The cutting tool is a Centre Fork held in a Rod and Strip Connector bolted to the ram. Two $2\frac{1}{2}''$ Strips are fixed to Angle Brackets attached to the ram by bolts 7 on each side. These Strips slide freely between $5\frac{1}{2}''$ Flat Girders 8 and pairs of face-to-face $5\frac{1}{2}''$ Strips 9, which are spaced apart by Washers on $\frac{3}{8}''$ Bolts.

The up-and-down movement of the ram is operated by a No. 1 Clockwork Motor bolted to one side of the column. A $\frac{7}{16}''$ Pinion on the Motor shaft drives a 60-tooth Gear on a $2\frac{1}{2}''$ Rod that passes through the Motor side-plates and the side of the column. The Rod is held in place by a Collar, and it carries a $\frac{3}{4}''$ Sprocket connected by Chain to a $1\frac{1}{2}''$ Sprocket on a $2\frac{1}{2}''$ Rod 10. Rod 10 is supported in a Bush Wheel and a Double Bent Strip fixed to one of the Flanged Plates. Two face-to-face $9\frac{1}{2}''$ Strips are mounted on a Pivot Bolt, which is fitted with a Collar and then is fixed in a Face Plate secured on Rod 10. The upper ends of the $9\frac{1}{2}''$ Strips are lock-nutted to a $5\frac{1}{2}''$ Strip 11. Strip 11 is free to slide in a Slide Piece fixed on a $2\frac{1}{2}''$ Rod that is mounted in a Bush Wheel and a Double Bent Strip attached to the side of the column. The other end of Strip 11 pivots on a 2″ Rod mounted in the ram and held in place by Collars.

The work table is a 4″ Circular Plate attached to a Face Plate fixed on a 1″ Rod. The Rod is supported in a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip and a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 12, and it carries a $\frac{1}{2}''$ Pinion. The table can be rotated by turning a $3\frac{1}{2}''$ Rod mounted in one flange of the Plate 12 and in a Double Bracket bolted to

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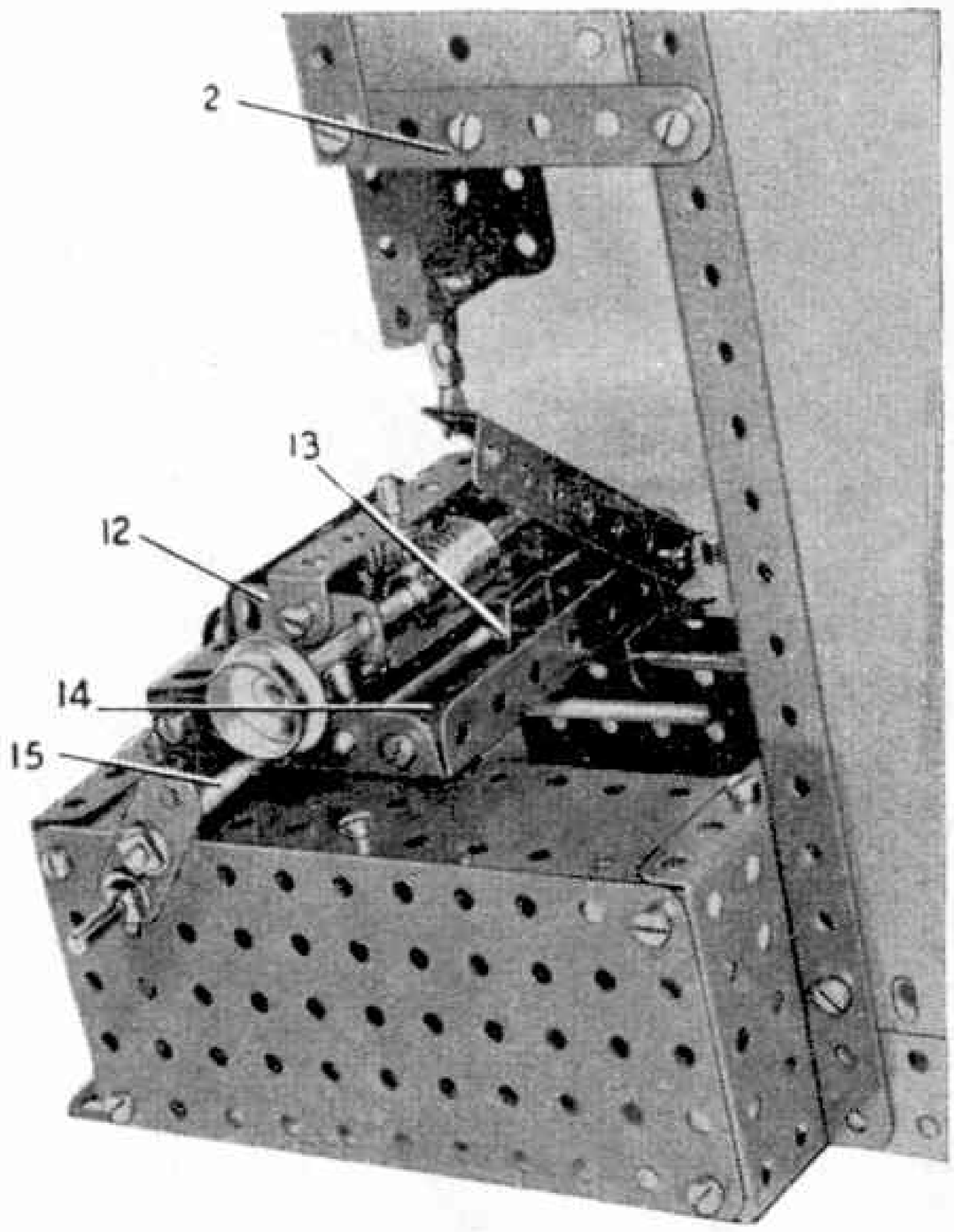


Fig. 3. The adjustable work table. The $3\frac{1}{2}$ in. Angle Girder is shown raised out of place in order to reveal the interior construction.

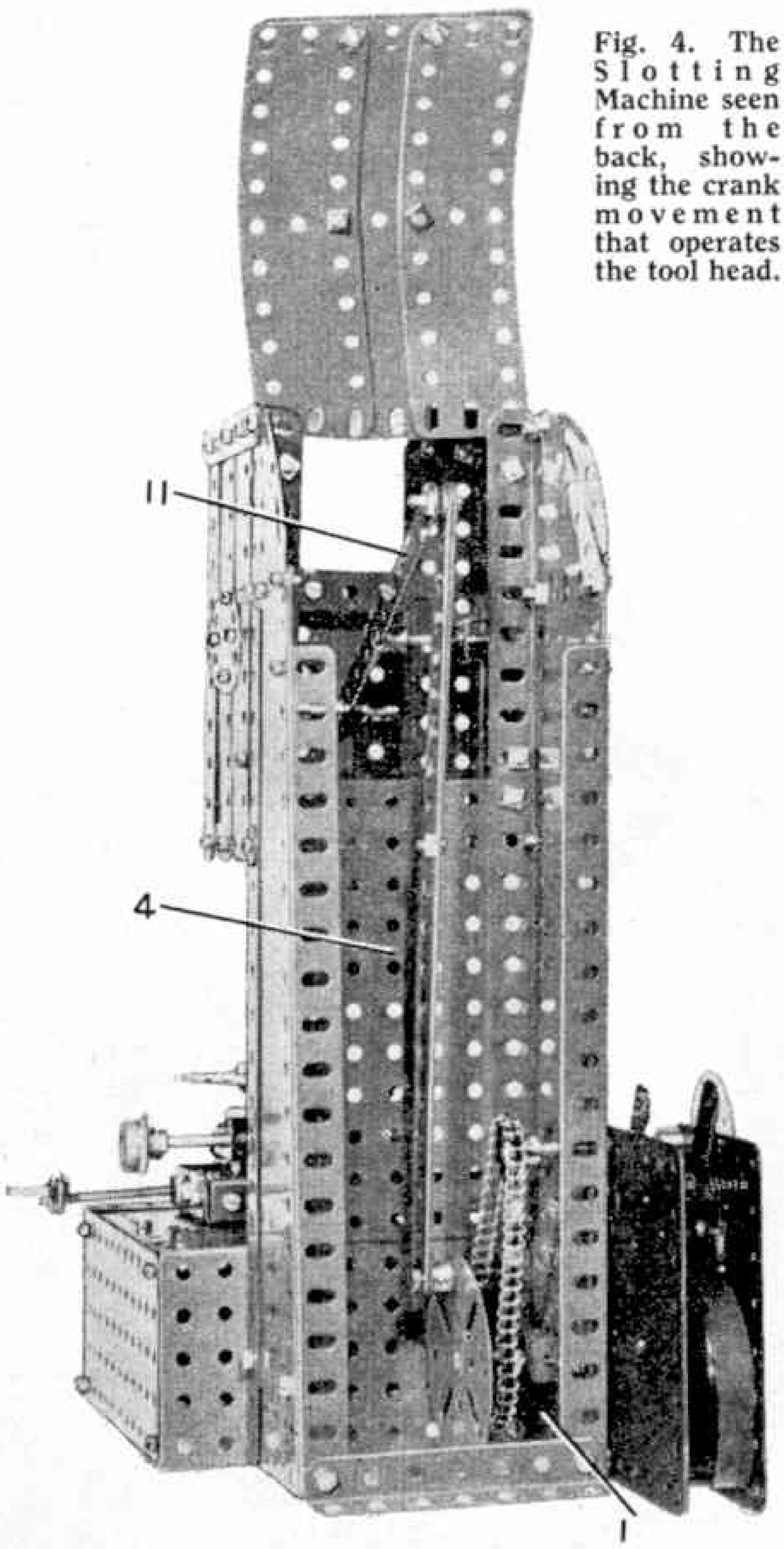


Fig. 4. The Slotting Machine seen from the back, showing the crank movement that operates the tool head.

MODEL OF THE MONTH

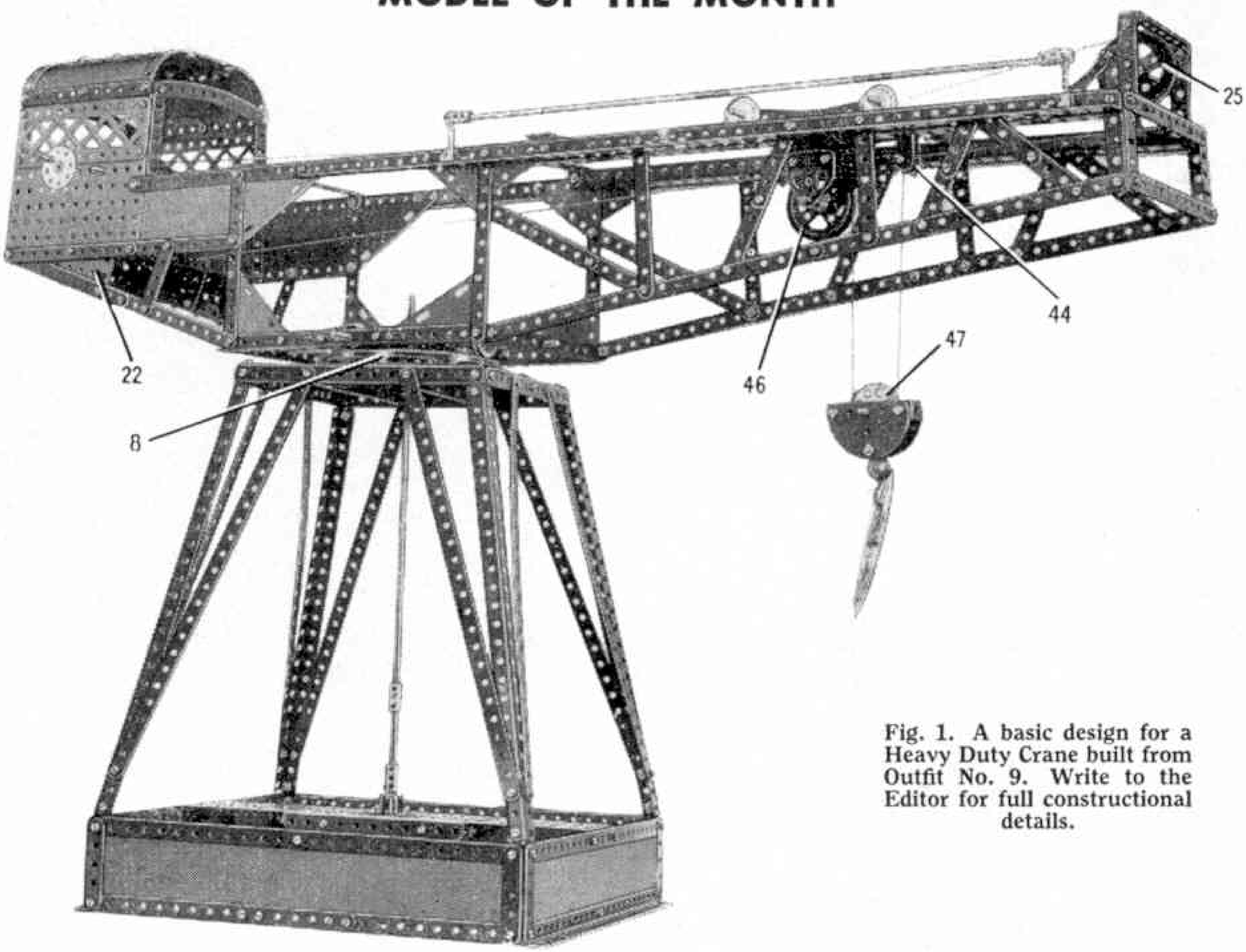


Fig. 1. A basic design for a Heavy Duty Crane built from Outfit No. 9. Write to the Editor for full constructional details.

HEAVY DUTY CRANE

CRANES are wonderful subjects for Meccano models for there are so many different kinds of both large and small types that a model-builder has no difficulty in selecting one that he can build with the parts available to him. The crane that we have chosen as the subject of our "Model of the Month" is one of the larger cranes capable of lifting really big loads. They are sometimes to be seen on dock-sides and in shipyards, and some of them are mounted on wheeled bases running on rails so that they can be travelled from place to place along the quay wall.

Their main features are a strong and sturdy tower, and an equally

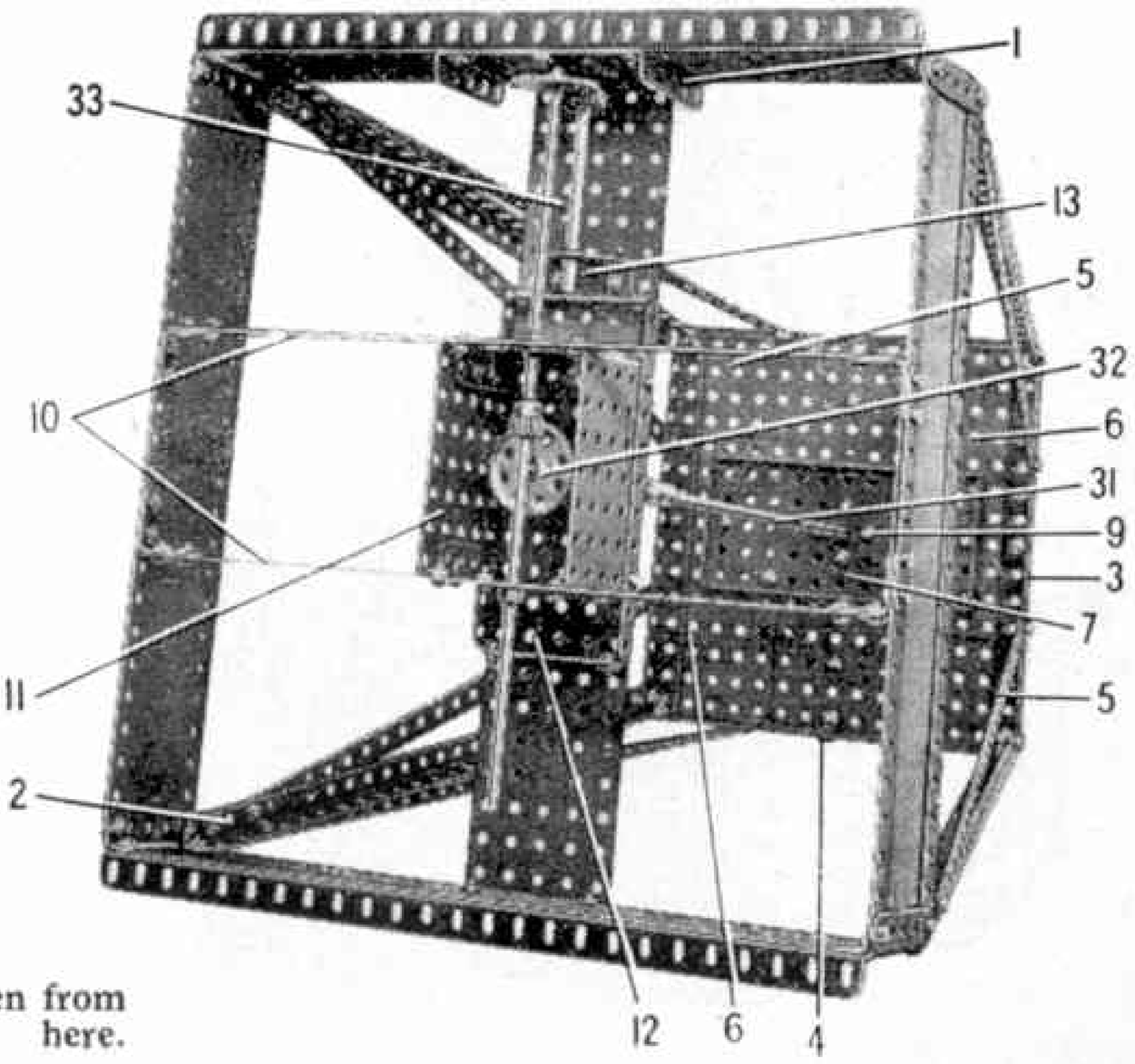


Fig. 2. The Crane Tower, seen from the base end, is shown here.

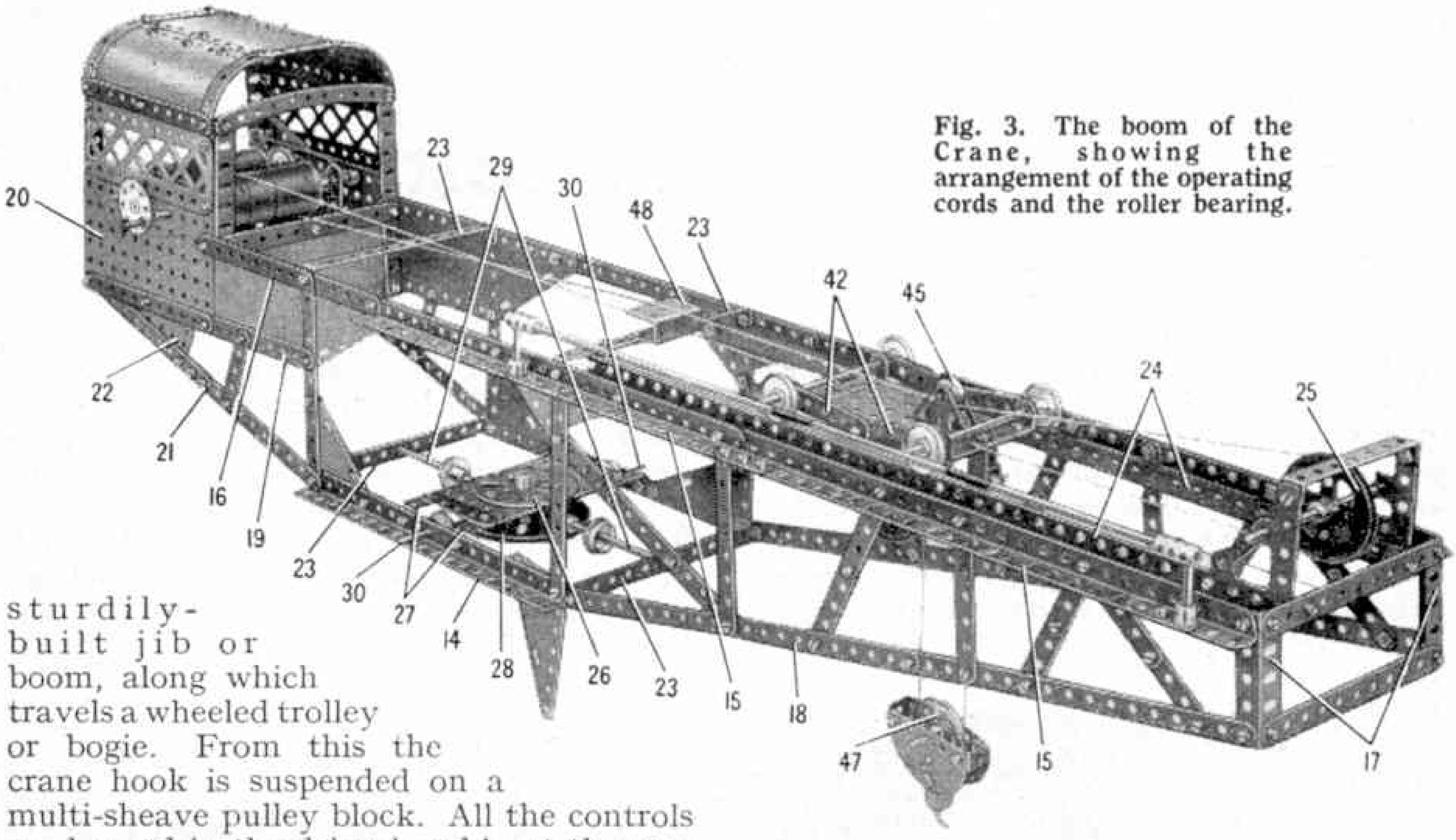


Fig. 3. The boom of the Crane, showing the arrangement of the operating cords and the roller bearing.

sturdily-built jib or boom, along which travels a wheeled trolley or bogie. From this the crane hook is suspended on a multi-sheave pulley block. All the controls are housed in the driver's cabin at the rear end of the boom. The boom itself pivots on a stout roller bearing mounted on top of the tower and can be swivelled through a full circle.

The Meccano model is a fine one both to build and operate, and in designing it we have tried to include as many as possible of the chief features of these cranes. It can be constructed from the parts in a Meccano Outfit No. 9 and is very strong and stable when completed.

The operations of the crane are carried out manually but readers who have suitable Motors available should be able to modify the model to take Motor drive if desired.

Full constructional details of the Heavy Duty Crane together with a list of parts required to build it, can be obtained by Home readers by writing to the Editor, enclosing a 2d. stamp for postage. Overseas readers in Canada, Australia, New Zealand, South Africa, Ceylon, Italy, Rhodesia and the United States of America should write to the main agents in those countries for their copies of the *current* "Model of the Month" instructions, enclosing suitable stamps for postage.

We advise readers who wish to build this model to apply for the instructions as soon as possible because we cannot guarantee to supply "Model of the Month" instructions after the end of the month in which the model is illustrated in the *M.M.*

So if you wish to avoid disappointment write for your copy as soon as you receive this issue.

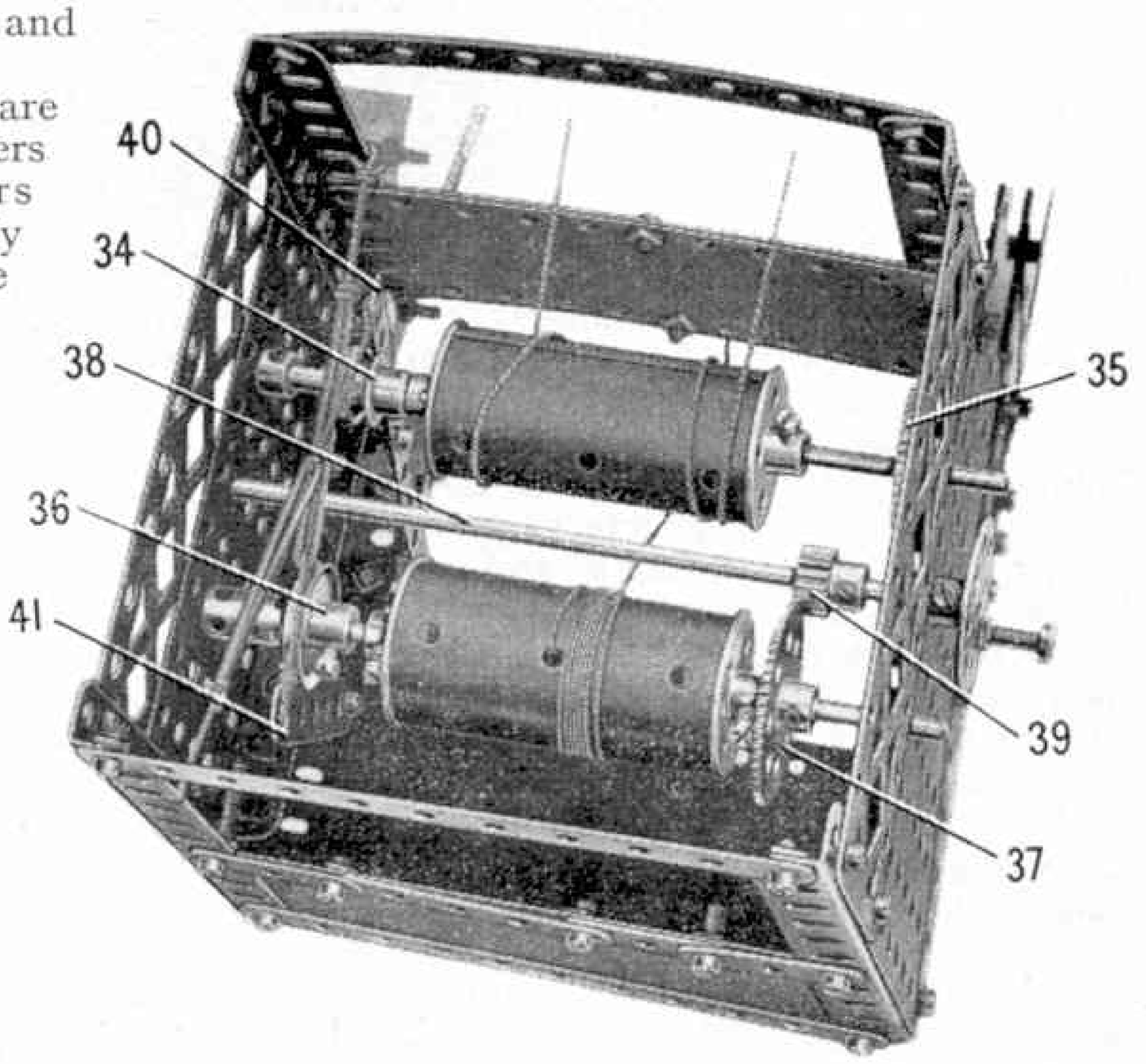


Fig. 4. The operating cabin with the roof removed to reveal the winding drums for traversing the trolley and for hoisting and lowering the load hook.

HORNBY RAILWAY COMPANY

A Castle Chat

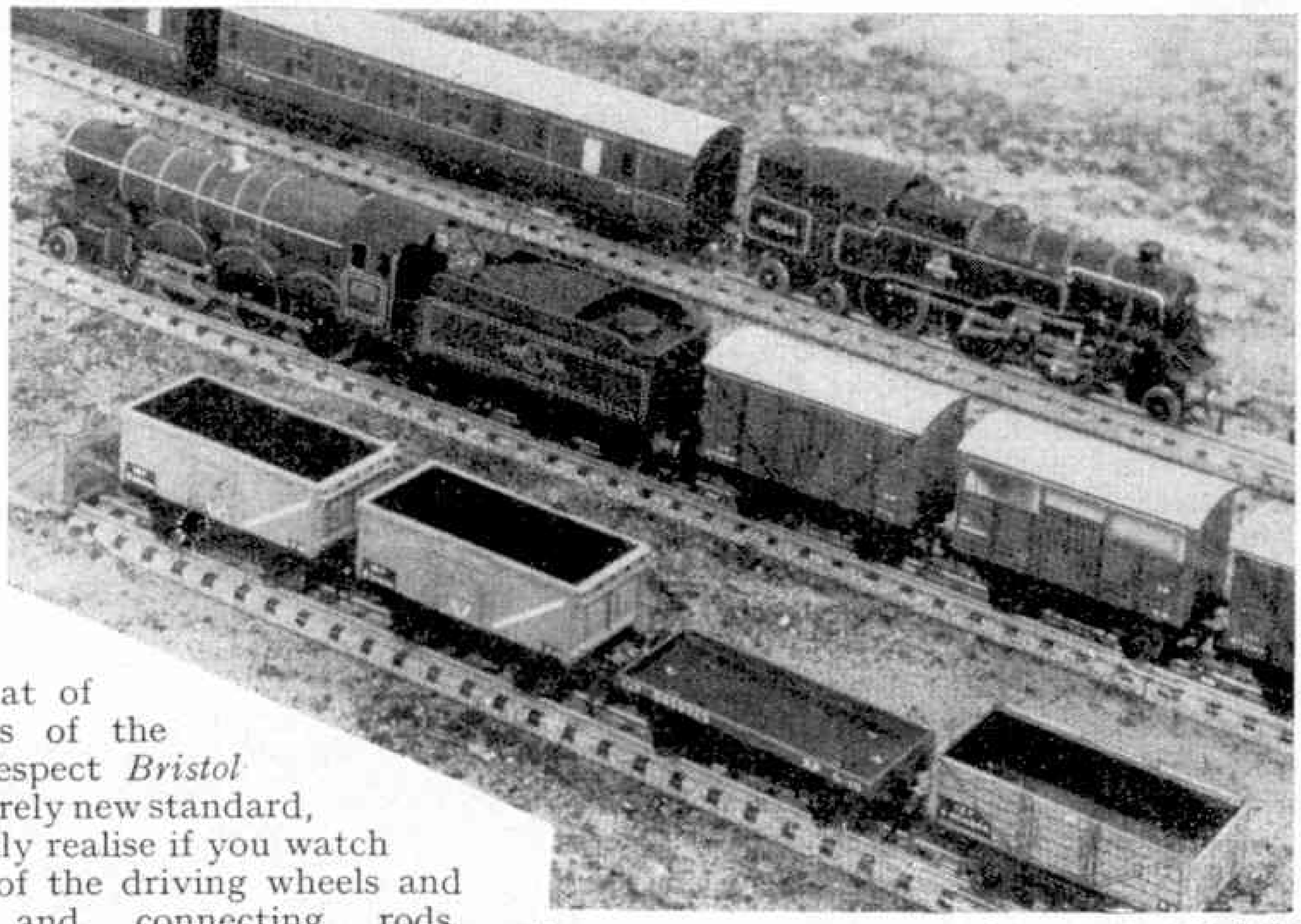
By the Secretary

THERE is no need to offer any excuse for referring again this month to the Hornby-Dublo *Bristol Castle* Locomotive, as so many enthusiasts have written to me about this fine engine. It has certainly captured the attention of all Hornby-Dublo owners, and of course the Western Region supporters among them have been loud in their praises of this new member of the Hornby-Dublo engine family.

Last month our talk included various running wrinkles, but I must point out again that the Hornby-Dublo Castle is designed to have a performance, to scale, in keeping with that of the real engines of the class. In this respect *Bristol Castle* sets an entirely new standard, as you will quickly realise if you watch the movements of the driving wheels and the coupling and connecting rods. Remember that for each turn of the wheels a real Castle puffs four times; apply this in imagination to your Castle and you will see what I mean. Scale speeds above that of the Castle would not be realistic and the movements of the coupling and connecting rods would not give knowing owners the right feel of satisfaction in watching them.

When running any locomotive it is necessary to attend to lubrication in the correct manner and you all know that the axle bearings of the rolling stock should be nicely lubricated as well. Do not just do this once and then forget it for months. Indeed, examine your vehicles from time to time, and spin the wheels to see how freely—or otherwise—they revolve.

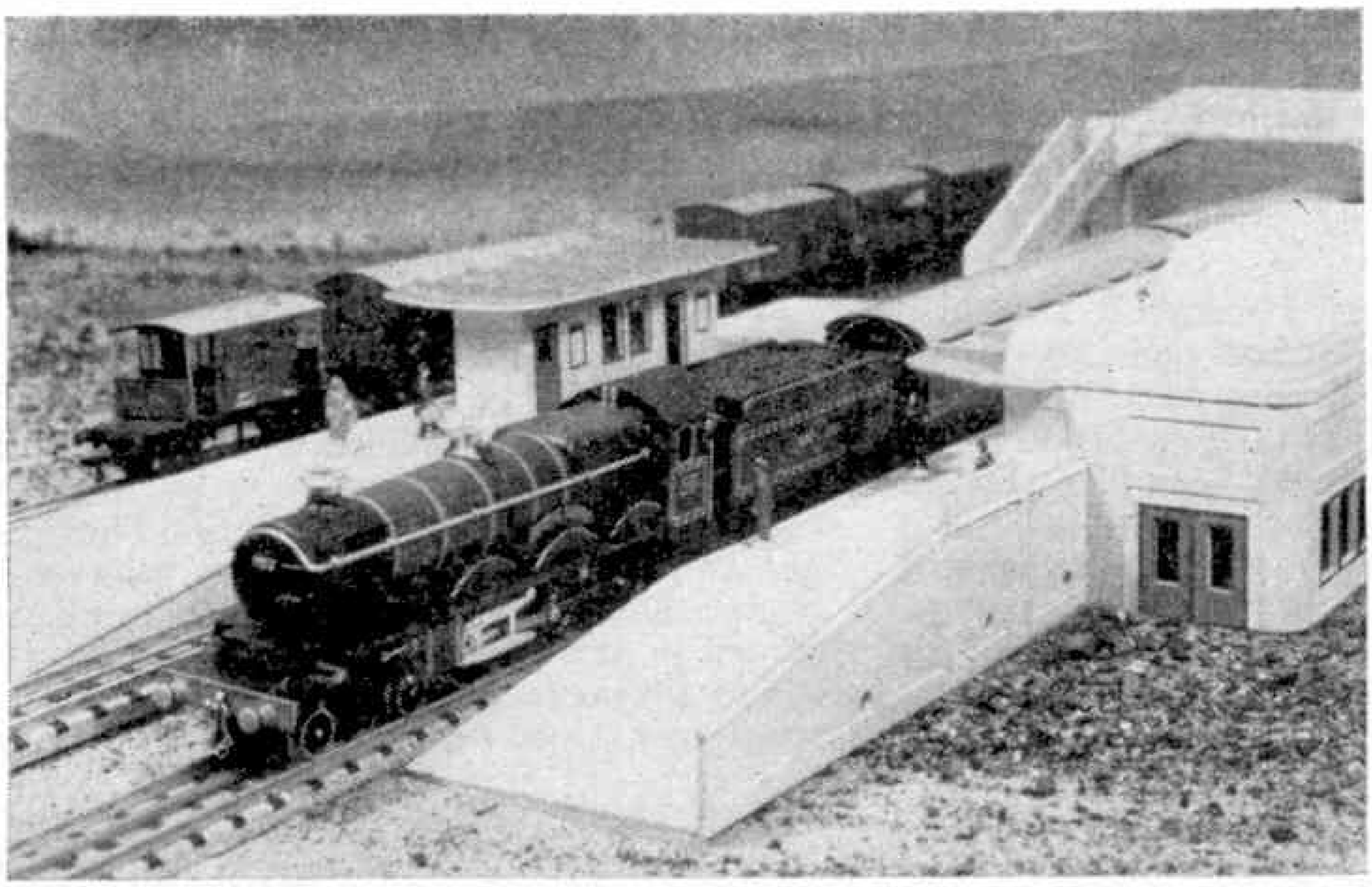
Going back to the engine, I should mention that lubrication of the armature shaft bearings on *Bristol Castle* should be carefully carried out, and this could with advantage be done at somewhat more frequent intervals than is usually the rule. This is a point that has perhaps escaped some Castle enginemen, but I am sure that they will now hasten to put matters right,



As a change from express passenger working "Bristol Castle" is here in charge of fast freight train on a Hornby-Dublo layout.

and to keep them right, so that the engine can maintain its good form.

Although express passenger work will form the bulk of the duties of a miniature *Bristol Castle*, as we saw last month, it is usual for miniature express locomotives, like many real ones, to take turns on fast freight trains. This accounts for the illustration on this page of *Bristol Castle* at the head of such a train. Probably most of you know that some Western Region fast freight trains have boasted nicknames given to them over the years by the operating staff and the men who



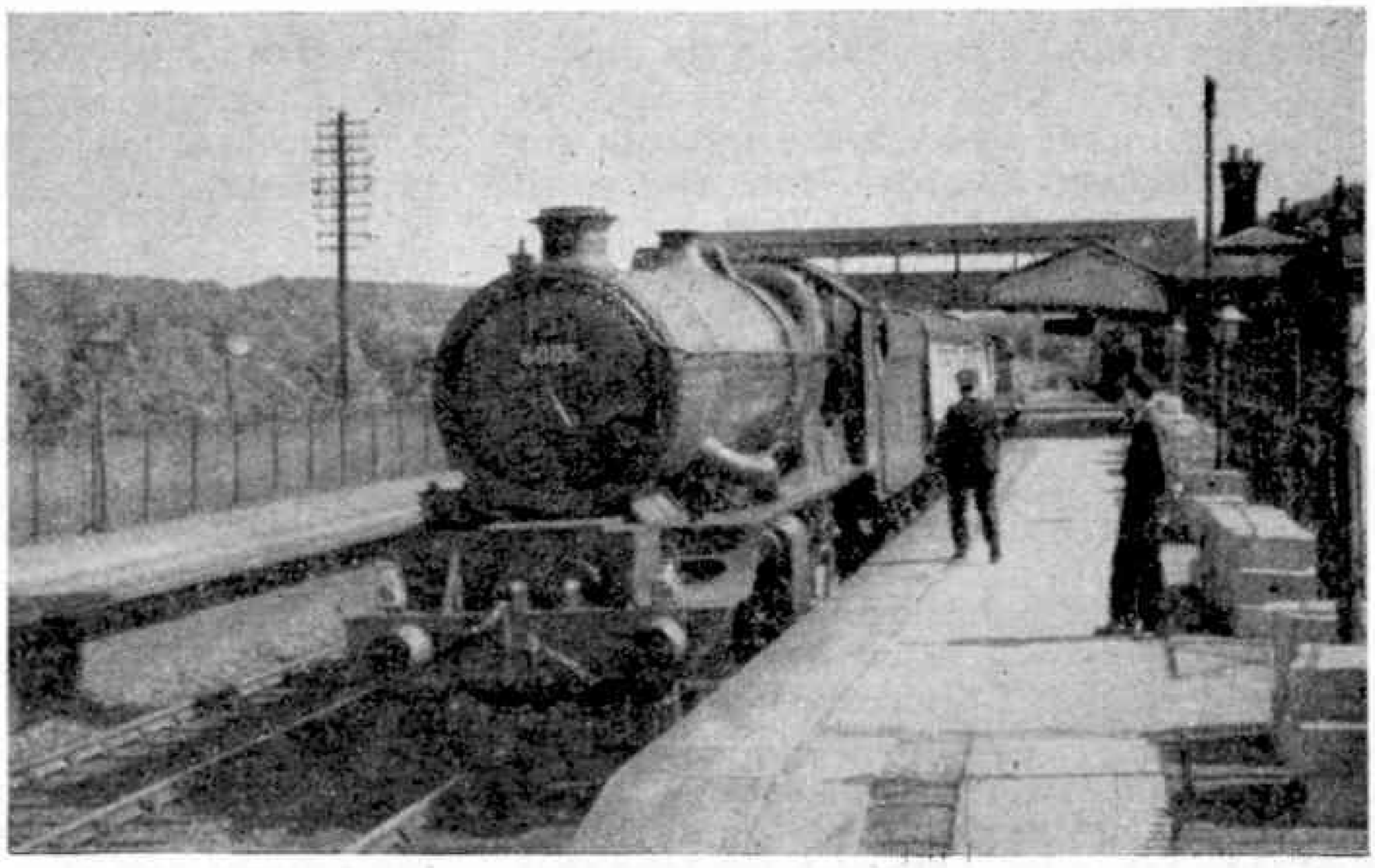
A Hornby-Dublo scene reproducing in miniature the situation shown in the lower illustration, as explained on this page.

run them. So your working programme can perhaps include a miniature *Moonraker*, or *Early Bird*, both of these names indicating the fact that many fast freights run at night or in the small hours. Other names suggest the cargoes carried or the district served. *Hardware* and *Western Docker* are good examples of this. Whatever your train, you can be sure that *Bristol Castle* will take it along at a good pace for a "fitted freight."

On such work the Castle will find its way into your sidings and yards, and this brings me to another point that can be mentioned with advantage. Do not be tempted to force your rails at all to effect some particular combination of curves and Points where space is restricted. This is poor practice in any case, and you cannot expect entirely satisfactory performance in such conditions. The wheel arrangement of *Bristol Castle*, with its large driving wheels, make it rather curve-conscious, so that the track alignment at curves and Points should be beyond reproach, or you may be inclined to blame the engine for indifferent performance, rather than your track laying.

Track work, andengineering operations in real practice sometimes involve the setting up of single line working over the length affected. A pilot man rides the engine of each train passing over the track that is still in use. Stops have to be made to pick him up, and to set him down.

I must use the rest of these pages to tell you that this month the fine new Hornby-Dublo wagon pictured on page xx becomes available. It is the SD6 Bulk Grain Wagon, and is the first of an entirely new range of rolling stock with completely detailed bodywork of moulded construction. The roof hatches and the side doors are well represented in the moulding, as are the accurately sectioned stiffening angles, and correctly-shaped ladders are fitted at each end. It is superbly finished in B.R. grey.



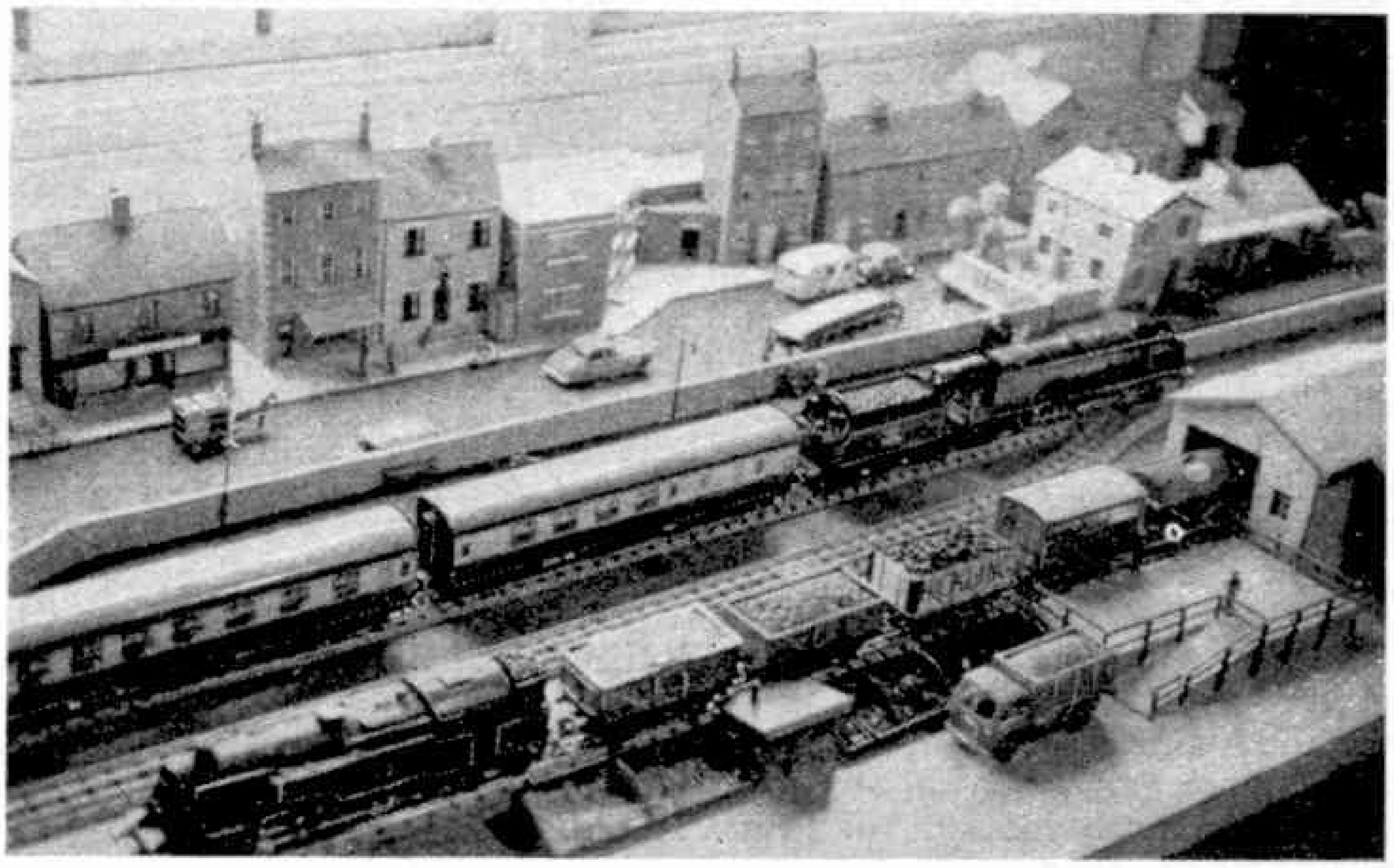
No 6005 "King George II" stops at Saunderton for the pilot man, who is about to board the engine. Photograph by J. Fleming.

News from Readers

Hornby-Dublo Layouts that are Growing Well

IN the *M.M.* in December 1956 we published a description and diagram of the Hornby-Dublo layout of *M.M.* reader D. C. Macnab (H.R.C. No. 201474), of Sandhurst, Kent. At the time photographs were not available of the system, but several have reached us since then and one of them is reproduced on this page. This illustrates very well the situation at the main station on the layout as it was, but since that time there have been further developments. This invariably happens on all good railways.

The general scheme is still the same, but the layout has been made wider at this point and developments from the original idea have taken shape. The fact that these follow generally the principles of the first scheme indicate the sound planning involved from the start. An attractive feature of the situation shown in the present picture is the sense of depth that is given, and the present arrangement must be even better still in this respect. There is an air of space in the yard in the foreground and about the main station, which is of sufficient length to handle the trains that normally run on the railway.

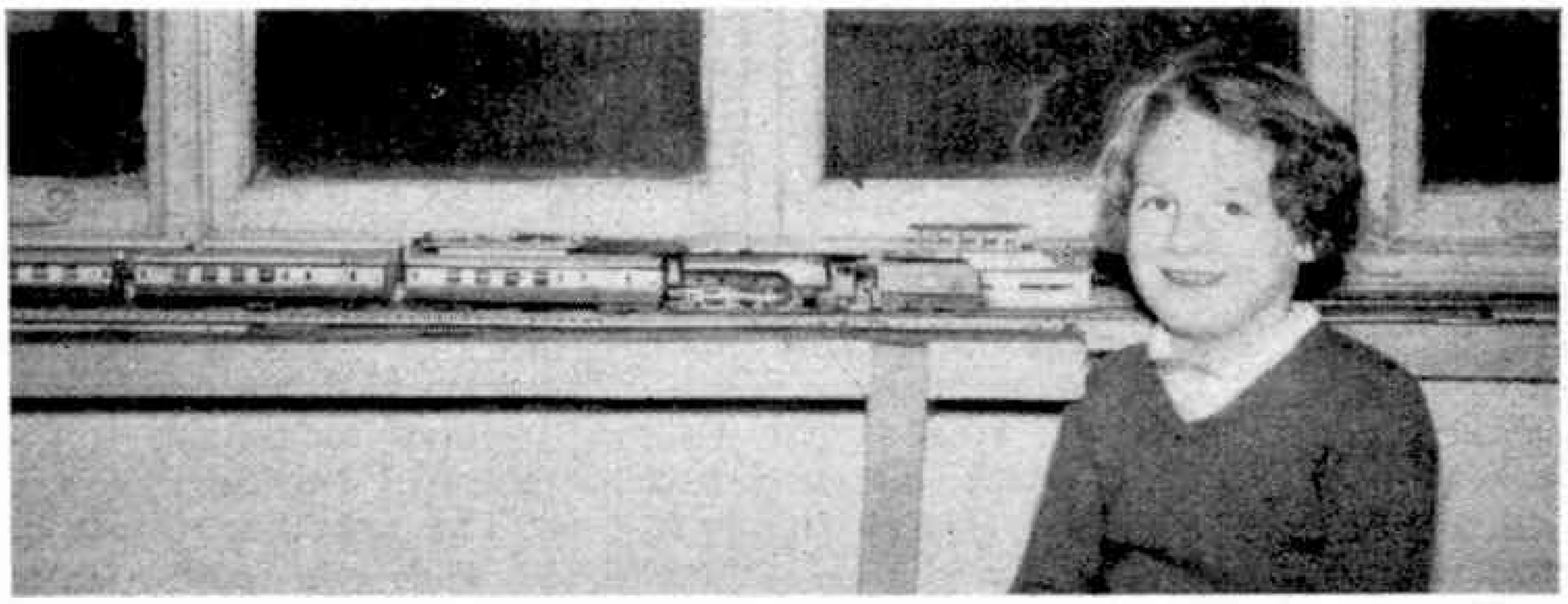


A realistic scene on the layout of Mr. D. C. Macnab, Sandhurst, Kent. The town effects in the background are very pleasing.

The diagram published with the earlier description showed the run-round loop arranged so that Locomotives arriving, as the *Duchess of Montrose* is in the present picture, can be uncoupled from their trains, run forward to the Buffer Stops and then taken back through the loop that you can see between the goods and the passenger trains in the present view.

The situation now differs only in the multiplication of such facilities. The additional width provided by an extension of the baseboard has made it possible to move the goods accommodation farther out and to provide in addition a two-road engine shed. Where the goods train is shown in the illustration, there is now an island platform with one face serving the loop mentioned earlier and the other serving another loop, developed from it, that actually encircles the island platform. The original loop has been extended to provide what we have sometimes referred to as a Buffer Stop section, so that the station as a whole is built to cater for more traffic than previously. The need for this has been brought about partly by the extension of the original platform road, on which the express train is shown, to become a branch line further on and this has involved the addition of a further engine to work the branch line train.

It is interesting to note that the main station is laid out on the baseboard in front of one of the windows of the room in which the railway is situated. This makes quite a good site for the station and the miniature township that has been developed between the railway and the window. The outline of the buildings shows up clearly and there



Margaret Fletcher, seen here, shares in the working of her brother's layout which runs on a raised baseboard.

is no need in such a situation for any further background. A window site has much to recommend it from several points of view.

Another railway that takes advantage of a similar situation for the placing of its main station platforms is that operated by *M.M.* reader Roger Fletcher, of Manchester. Roger gets plenty of assistance from his sister Margaret, whom you see in the picture above, and their railway is such that they must have quite a busy time working the traffic on it. There is a double track main line, which is continuous, and there is an additional outer track as well.

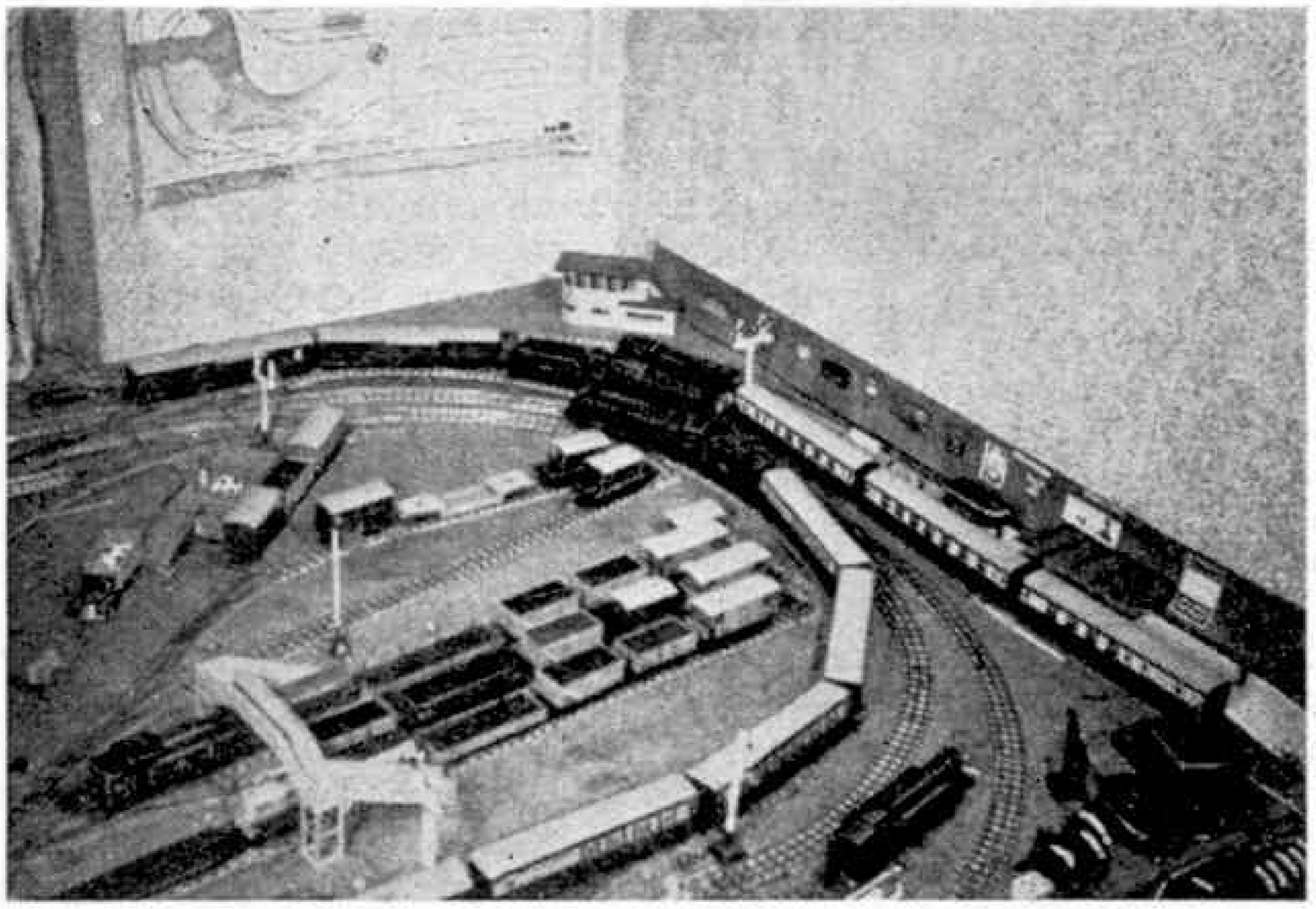
Outside the main oval there is a Hornby-Dublo Turntable leading to a five-road engine depot. The situation of the Turntable in an alcove is another instance of a Hornby-Dublo engineer taking advantage of the "natural features" of the space available for his railway. Thus the Turntable and engine yard make very good use of a location in the room that would hardly be suitable for any main line purpose. This, in addition to the use of the window site for the main station platforms, shows that the final stage of the layout was well in mind during the earlier development.

A part of another baseboard system appears in the illustration on this page. Unlike the railway just described this does not follow the walls of the room, but the system is self contained on a rectangular board 4 ft. wide and over 10 ft. long. This is the layout of Mr. G. Alan Radford, of Leighton Buzzard, who has developed a realistic and busy system providing for continuous running, and for terminal operations. The latter take place at the platform just visible on the right of the illustration. The terminus, *Brantmus*, is situated on a branch that joins the main system at a station called *Manlin Junction*, the yards of which are seen in the centre of the illustration. There is another station as well, on the opposite side of the main oval, and this is known as *Hilton Road*.

Although the layout is extensive, control arrangements are relatively simple. Main line operations are controlled quite separately from subsidiary movements, so that shunting can be carried out independently of main line running.

There is a regular branch line service between *Manlin Junction* and *Brantmus*, but some of the local passenger trains from the main line services also work to and from the terminus.

A help to the traffic controller is a large diagram showing every feature of the system. This faces the operator and part of it can be seen on the wall in the lower picture on this page.



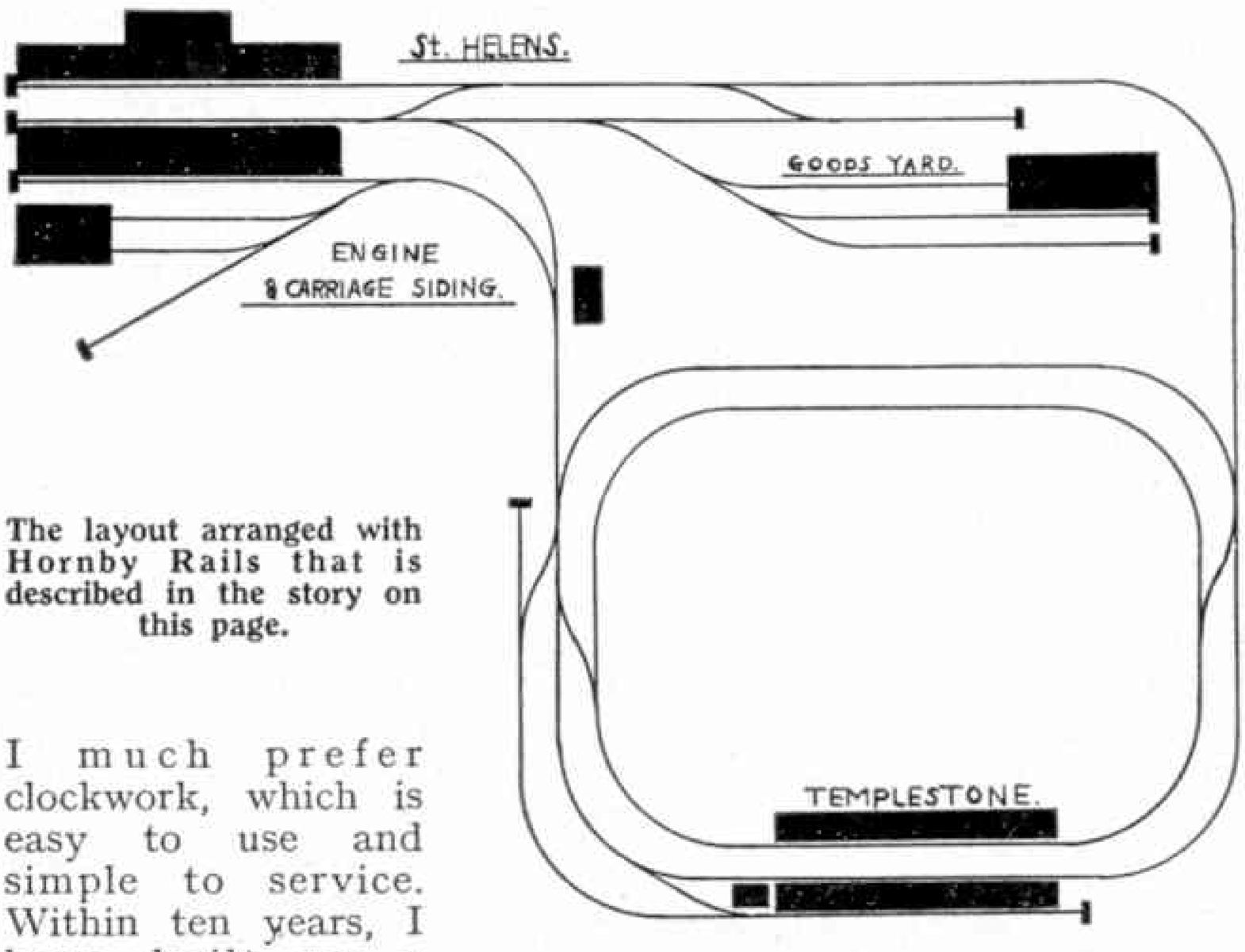
View of part of the Hornby-Dublo system of G. A. Radford, Leighton Buzzard.

Engineering a Hornby Railway

By Roger Turff

BE your own engineer, your own surveyor, your own traffic controller—in fact, be any sort of railwayman that takes your fancy. With a miniature railway it is one of the easiest things in the world to do.

Most people start in much the same way as I did, with a Hornby Gauge 0 Clockwork Train Set. But unlike most people I have not changed to an electric layout, because I much prefer clockwork, which is easy to use and simple to service. Within ten years, I have built up a layout that has become really too big for one person to run.



The layout arranged with Hornby Rails that is described in the story on this page.

From the start, it was the engineering side of developing a miniature railway that interested me. I soon found that to run a layout properly it is necessary to have a baseboard, preferably raised off the floor on trestles. The raised board helps to keep the track free from dust and work on the line is much easier than on tracks laid upon the floor. The baseboard can be made out of hardboard, well framed and supported, at a reasonable cost, and a good foundation and base form a most important part of good railway modelling.

There is a great deal said about the respective merits of continuous and end-to-end-running, but I have always found that a compromise between the two works best. As the diagram here shows, I have managed to provide for both types of working.

The first line to be laid was the outer of the two continuous circuits. I put down the inner circuit shortly afterwards, and immediately made it a rule to work trains clockwise on the outer circuit, and anti-clockwise on the inner circuit. This simple arrangement was surprisingly important, for it is very easy to have accidents when several trains are running and shunting also is in progress. Apart from this, the method is good railway practice, and adds to the realism of the working as a whole.

From the right hand side of the outer circuit, as you see it in the diagram, I ran a long straight into *St. Helens* station, which became the terminus of the line. From the left-hand side of the circuit, another line was made to connect with the station, which made it possible for me to run a train out of *St. Helens*, work it over the continuous main line for as long as necessary, and then send it back into the terminus.

The next addition was the other station, *Templestone*, which was developed to serve a small market town. Both stations had very long shunting "necks" which were extremely useful during shunting operations. The goods yard and the engine sheds at *St. Helens* completed the layout.

Railway modelling is the most fascinating of hobbies, because the working of trains is not necessarily the be-all and end-all of it. The modeller is branching out into the making of a miniature world when he starts to make scenery for his trains to run past. It's almost like being a king, with a country to play with. Don't you agree?

Club and Branch News

WITH THE SECRETARY

Merit Medallions

Below is the annual list in which I place on record the names of Club members who have been awarded the Merit Medallion during the past year. I congratulate the members concerned, and I share their pleasure in achieving this official recognition of good work for their Club, and for the Guild.

I will repeat, for the benefit of new Clubs, that two Merit Medallions are available for each Club in each Session. to be awarded as a mark of appreciation of good work done by their members. This loyal service can consist of the recruiting of new members, new ideas for improving the Club programme, help in organising meetings, and so on.

Cape Peninsula (South Africa) M.C.—Cohen, C.; Weir, H. Christchurch (New Zealand) M.C.—Boundy, R. Consett and District M.C.—Carhill, R.; Hall, A.; Trout, G.; Younge, B. Exeter M.C.—Furse, E.; Wills, G. Fremantle and District (Western Australia) M.C.—Howe, T. Maylands (Western Australia) M.C.—Bransby, W.; Carter, C.; Carter, L.; Jones, R.; McIntosh, D.; Nunn, L.; Strang, R.; Taylor, R. Mile End (Portsmouth) M.C.—Bevis, R.; Bradbury, P.; Dart, R.; Marten, P.; Ponchard, R.; Wheeler, F. St. Thomas District (Exeter) M.C.—Aylward, J.; Banfield, P.; Garnsworthy, C.; Lee, D.; May, L.; Rendle, L.; Somerwill, B.

FORTHCOMING MECCANO CLUB EXHIBITION

The Mile End (Portsmouth) M.C. are holding an Exhibition on Wednesday, 12th February, in the Buckland Congregational Church Hall, Kingston Road (corner of Queens Road), Buckland, Portsmouth. The Exhibition will open at 7.15 p.m. Admission: Adults, 6d.; Children, 3d.

Model-builders in Portsmouth and district are invited to enter a model at a fee of 3d. which will go towards a prize, and those intending to enter should bring their model to the Hall at 6 p.m.

PROPOSED H.R.C. BRANCH

New Zealand—Mr. A. G. Campkin, 224a Blockhouse Bay Road, Avondale, Auckland S.W.3, New Zealand. (Telephone: 88-899).

CLUB NOTES

Consett and District Y.M.C.A. M.C.—The Open Day was a huge success and very well attended by both parents and friends. The extensive display included the partly built model industrial area featuring a gauge 0 layout, a gauge 00 scenic layout that eventually will be about 20 ft. × 6 ft. 6 in. in extent, and an excellent display of Meccano working models. The Day ended with a film show by Mr. Cook. *Secretary:* D. Whitfield, c/o Consett and District Y.M.C.A. M.C., Sherburn Terrace, Consett, Co. Durham.

Mile End (Portsmouth) M.C.—Members have been busy building models either at the Club or at home for display at the Meccano Exhibition this month. A concert is to be held in aid of Club funds. The tickets and programmes are being printed on the Club printing machine. A Mr. Marck, of Southampton, paid a surprise visit to the club room. After watching the members "at work," Mr. Marck gave an interesting talk in which he described his building of a giant Meccano blocksetting machine for his two sons. *Secretary:* Mr. A. J. Nicholson, 213 Sultan Road, Buckland, Portsmouth.

SOUTH AFRICA

Cape Peninsula M.C.—At the annual inter-group competition the group of members headed by Colin Cohen, the Secretary, won the first prize with a model of a fairground dive-bomber. The competition was judged by two outsiders, one a qualified engineer and the other Tony Mills, an old Club member who is now a fourth year University student in applied mechanics. A visit to the largest and newest electricity generating station in Cape Town has been arranged. *Secretary:* C. Cohen, 23 Upper Rhine Road, Sea Point, Cape Town, South Africa.

BRANCH NEWS

Kidderminster Model Club—Track operations have been continued on the extensive Hornby-Dublo track running the full length of the room. A 10 min. service was operated, and in the intervals shunting movements were carried out at the two termini. A social and a railway quiz night were well patronised. A railway outing for W.R. enthusiasts, to cover Oxford, Didcot and Reading, has been arranged. *Secretary:* A. J. Potter, 35 Woodfield Crescent, Kidderminster.

Members of the Norbury M.C. watching operations on the Club layout. A splendid display was arranged as part of the Annual Exhibition last November. Photograph by C. J. Stratmann.

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For other Stamp Advertisements see also pages 108 and xx

Stamp Collectors' Corner

By F. E. Metcalfe

TURKS AND CAICOS ISLANDS

The philatelic history of the Turks and Caicos Islands is not a very long one as far as the group's own stamps are concerned, for the first issue did not appear until 1900, long after its political separation from the Bahamas. And incidentally, this group of islands is not entering the forthcoming West Indian Federation, so its latest set of stamps will not be changed, as will those of the ten colonies that are merging to form the Federation.

Right from the beginning, the issues of Turks and Caicos Islands have shown none of the rather stop-gap characteristics of those of a country first getting its own stamps. In fact, the very first set was quite a sophisticated affair—a single design in two sizes, which depicts a heap of salt—still one of the colony's important productions—with a schooner beyond it. Salt is of importance to the colony's economy, and it is rather tantalizing to contemplate that water is scarce.

The first set is quite scarce on the whole, and there is one stamp in it that is well worth looking for. I am reminded of this because I picked up a mint pair recently, at about a tenth of their value. The set goes up to the 3/– value, but there are two shades of the 2½d. value, and it was the blue one which I found. This is scarce enough to be worth looking out for. Blue was the first colour used for the stamp, but not long afterwards another printing appeared in a grey-blue, which is not as valuable. The two highest values, 2/– and 3/– are much more valuable than the blue 2½d.

The set was on sale until 1909, but in 1905 the ½d., 1d. and 3d. values appeared in the new watermark Multiple Crown C.A., instead of the single. Again there is a stamp worth searching for. The 3d. value in the multiple watermark is the good one mint, as collectors say, but it is much better used.

In 1909 there was the first real change in design. The new stamps, all of small size, bore the portrait of the then reigning monarch, King Edward VIII, and again we have a good set, with the 2½d. value about the best, with the exception of the 2/– and 3/– values, as before. The scarcity of this set arises from the fact that it was only on sale for a year, for in 1910 we got the first KGV set, with all the fun that the use of several differently coloured papers for the 3d., 4d. and 2/– values provided.

How well I remember the excitement that those paper changes made during the first World War, when shortages made them necessary. We had something of the same kind during the last war, though not with the Turks and Caicos stamps, but with the high values of Bahamas, the chalk coated paper of which had to be changed to a substitute paper lacking the coating.

But it was the colours of the paper of the Turks and Caicos stamps which was changed, and for full details of these changes I think a catalogue, such as Gibbons Part 1, had better be consulted, by those interested.

It was during the first World War that collectors of Turks and Caicos stamps got most excitement, however, for the 1d and 3d. stamps were overprinted WAR TAX, and all the varieties known to philatelists resulted. There were inverted overprints, double overprints, stamps where some missed the overprint, resulting in pairs with and without—all the fun of the philatelic fare, in fact. Some of these varieties are very scarce, and in consequence costly. But the straightforward overprints are mostly quite common, and within the reach of all collectors.

In 1922 there was a slight change in the design, but it still included the head of King George V, and these stamps remained on issue until the coming of the first "KGVI" set of 1938. This was replaced in 1950 by a pictorial set, which I believe will prove as scarce as some of the early sets as time goes on. In the meantime there had been the usual commemorative sets, Silver Jubilee, Coronation, etc., and a very attractive set issued in 1948 to commemorate the 100th Anniversary of the separation of the Islands from the Bahamas. Like the 1950 set this is attractive, and also should have a good future.

The designs of the 1950 set not only include a map of the Islands, on the 4d. value, but also depict local scenes and activities on the other values. The purchase now of either a short or a full set, while one can be obtained at not much above face value, will be very worth while.

And now we come to the "QEII" set issued on 25th November, 1957, which is one that very few collectors will be able to resist. We all know how popular thematic stamps are and when this new Turks and Caicos set was first announced, and details of the designs given out, there were some who felt that the designs had been chosen specially to appeal to those interested in the new thematic cult.

I don't think that any such reason was behind the issue, however. It is true that a small country like the one concerned finds the cash resulting from the sale of stamps to collectors quite useful. But more and more it is being understood what valuable publicity items postage stamps are, and as these West Indian Islands provide wonderful fishing facilities and it is desired to attract fishermen and other tourists, what could be more suitable than a set of stamps depicting the various kinds of fishes to be found in the waters

(Continued on page 110)

This old PENNY RED AND approx 500 STAMPS for only 1½

To introduce our approvals we will send you the famous PENNY RED issued in Britain 100 years ago, plus about 500 guaranteed unsorted stamps for only 1/–. Many scarce and interesting stamps have been found in these packets. Complete satisfaction or money refunded. Don't delay—send today.

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Are listed for Members of the "ACE OF CLUBS." Full details, and selection of stamps on 10 days approval, sent on application—No postage required. Write to:

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For other Stamp Advertisements see also pages 106 and xx

Stamp Gossip

GHANA

A collector wrote recently about the set of Ghana stamps he had bought earlier in 1957. This was the set of four issued to commemorate the founding of the new Dominion. He was feeling very cross apparently, because when he bought the stamps he was assured by the dealer who supplied them that they would be obsolete in June, and scarcer used, which is how he bought them. Now he says they are still in use, and getting more common every day in a cancelled state.

I can assure that collector and others who bought in similar circumstances that the dealer was not to blame, for when the stamps were first issued, it was officially stated that they would be withdrawn on 6th June and that three of them of values 2d., 2½d. and 4d. would be replaced by "QEII" stamps, overprinted like the other values at present on issue. These three latter stamps were actually overprinted, and sent out to the various Ghana post offices, ready for release, and some actually were sold, before time. But when the moment came it was decided to continue with the commemorative stamps, and to withdraw the overprinted specimens.

Of those replacements sold, of total value about £600, the 2d. value is the commonest, and even these are selling at about £1 each used, with the correct postmark. The 2½d. and 4d. are much scarcer. Copies of all three overprinted "QEII" are turning up all the time. So keep your eyes open. A find, particularly of the 4d. value, would be a find indeed.

GENERAL PATTON

Those of us who remember happenings in the last World War will remember that hectic figure the American General Patton, who after a brilliant war career died in 1945 in a car accident. He commanded the armies that landed in Sicily in 1943. A year later he was in Normandy, and altogether he was in the thick of the fighting until Victory came.

On 28th October Belgium issued a set of five stamps, each bearing a surcharge, the proceeds of which will be devoted to the "General Patton Memorial" Patriotic Society. I don't know just what the objects of this society are, but I do know that the stamps would have pleased the late General, for the designs are what one would call dynamic, particularly the top value, which is illustrated. This depicts Renault tanks charging victoriously at St. Mihiel, in the first World War. The officer in the forward tank represents Major Patton, as he was then.

UNITED EUROPE

I imagine that many readers will wonder what the Netherlands stamp illustrated here is all about. The short answer is, that it is devoted to an object that scarcely seems very obvious just now—a United Europe. The star depicted is known as the Europe Star. It will be noticed that at each point there is a letter, and following these clockwise we can spell out the name EUROPA.

Collectors interested will remember that in 1956 the various European countries concerned brought out stamps of the same design, but in 1957 each country had its own design, so there was one piece of collaboration which has not proved very enduring.

SPUTNIKS

I suppose that the Russian satellites are all part of the International Geophysical Year, with most countries also doing their bit, even if their contributions are not as spectacular as that of the U.S.S.R. A number of stamps have been issued in connection with the event, and of these the set I like best comes from Norway, one value of which is illustrated. A set will cost about half a crown mint, and a copper or two less used. For that sum you will have a nice addition to your collection.

It will now be almost possible to make up a nice little collection of Antarctica stamps, which will have some connection in designs, if in nothing else. Sometime we can perhaps go into the question of such a collection.

"RED CROSS"

Mr. Kooka, of Bombay, has again kindly obliged with a mint copy and a nice cover of India's first "Red Cross" stamp. With so many stamps to write about, it is quite impossible to deal with more than a fraction of those which are issued, but this latest Indian "commemorative" is so attractive, and the object behind the issue so worthy, that it had to be mentioned If India keeps up this standard, its stamps will easily maintain their present popularity.

THE MONTH'S TIP

The current New Zealand "Health" stamps have been issued in miniature sheet form consisting of small sheets of six stamps each, of the two values that make up the set. The first lot of miniature sheets had the watermark sideways, and these were what most dealers got. To fill the remaining orders sheets were issued with the watermark upright. I think that if collectors get both values in miniature sheets with watermark sideways and also upright, at today's prices, they will not be sorry in the long run.

Miniature sheets are very popular overseas, and these New Zealand "Health" examples should in time be worth more than they are now. Many more could have been sold than were available. They were put on sale on 25th Sept., and were all sold by early Oct.

Uranium from Canada—(*Continued from page 59*)

trucks up the incline. One of these hills was called Suicide Hill, the other Unnecessary Hill. It was quite a common sight to see a line of traffic a mile long at the foot of these hills, waiting to start up.

The trucks used were equipped with special tyres, but getting up hills was still tough. The road was seldom in good condition. In spring it was impassable and had to be closed to traffic, so deliveries had to be planned well ahead, but work continued in sub-zero weather right through the winter months, when the temperature was often 38 deg. F. below zero.

With the Blind River area developing so rapidly, it was almost certain that by this time Canada would be producing uranium at a rate exceeding by a wide margin the total for all the rest of the world. In 1957 the dollar value of Canada's uranium production was about £116 million a year. In 1958, value of production in the Blind River area alone is expected to reach some £110 million. In comparison, South Africa uranium production is £35 million a year; that of the United States £30 million, and those of the Belgian Congo and Australia about £21 million each. The Soviet bloc has some rich ore, but the tonnages are believed to be small.

This article, and the illustrations, are reproduced from The Shell Magazine, by courtesy of the Editor.

The End of an Era—(*Continued from page 69*)

carried without affecting private and commercial motor traffic. It was intended that the tramways be further extended and modernised in conjunction with bus services after the war, and ambitious schemes were planned for the city centre, but in 1945 the decision was taken to abandon the tramways.

When buses began to replace the high capacity tramcars a great controversy broke out over the relative merits of the rival schemes. It was pointed out that with the combination of light railway and bus service first proposed, street tracks would have been eliminated, and this aspect has again attracted attention because of the problems that have followed the growth of traffic in the city. Will the future see the return of rail vehicles in the form of Rapid Transit lines that will help to speed up Liverpool's traffic, and enable it to travel more smoothly? Such lines are giving excellent service on the Continent and in the United States.

Among the Model-Builders—(*Continued from page 95*)

mechanism for use in simple model cranes to control the hoisting and lowering drum or rod. It consists of a Pinion fixed on the hoisting rod, which is represented in Fig. 4 by a Crank Handle. The pawl is formed from a 2½" Strip, to which is bolted a Double Bracket 1 and an Obtuse Angle Bracket 2. The pawl is pivotally mounted on a ¾" Bolt locked by two nuts in the side of the crane cab, in such a position that the end of the Obtuse Angle Bracket bears on the Pinion as shown. This arrangement allows the Crank Handle to be turned freely when raising the load, but prevents it from moving in the reverse direction. To lower the load the pawl is raised from the Pinion by pressing lightly on the end of the Strip.

Russia's Civil Air Fleet—(*Continued from page 80*)

and it may enter service later this year.

Finally comes the giant Tu–114, largest air liner in the world, with a span of 190 ft., room for up to 220 passengers in its huge cabin, and with four 12,000 h.p. Kuznetsov turboprops that give it a cruising speed of up to 500 m.p.h. and sufficient range to fly non-stop from Moscow to New York with 120 passengers. Based on the *Bear* bomber, it has a 40 ft. bigger span than the Boeing 707 jet-liner and probably weighs as much. The result is worthy in every way of its name, the Russia, and the fact that it was built to coincide with the 40th anniversary of the Russian Revolution of 1917.

Another, and perhaps greater surprise, produced at the same moment, was the Mi–6, which is by far the biggest helicopter in the world. It is powered by two 3,500 h.p. Soloviev turbine engines mounted above its cabin, carries 70–80 passengers and has already been developed to the stage where it has broken load-carrying records by lifting nearly 12 tons to a height of 7,875 ft.

Aeroflot plans to be equipped entirely with jet and turboprop aircraft by 1960, and with aircraft such as these it will be not only one of the largest but one of the finest airlines in the World

An Attractive Model Slotting Machine—

(*Continued from page 97*)

the Plate. A Worm Gear on this Rod engages the ½" Pinion.

A 1½" × ½" Double Angle Strip and a Double Bracket 13 are bolted underneath the Plate 12, and each of these parts is free to slide on a 4" Rod, which is mounted in 2½" Strips bolted to the flanges of a 3½" × 2½" Flanged Plate 14. A 3½" Screwed Rod 15 is held in place at one end of the Plate 14 by two sets of lock-nuts, and it is screwed into a Threaded Boss fixed underneath the Plate 12 by a bolt. The Plate 14 is edged by two 3½" Angle Girders on each side.

Two 2½" × ½" Double Angle Strips are bolted underneath the Plate 14 and these slide freely on 6½" Rods 16 held in the base by Collars. A 4½" Screwed Rod 17 is passed through the front of the base and is located by two sets of lock-nuts. The Screwed Rod 17 is threaded into a Threaded Boss fixed underneath the Plate 14 by a Bolt.

Parts required to build the Slotting Machine: 2 of No. 1a; 7 of No. 2; 3 of No. 3; 2 of No. 4; 4 of No. 5; 5 of No. 6a; 2 of No. 8; 2 of No. 8a; 8 of No. 9; 5 of No. 9b; 2 of No. 9d; 1 of No. 9f; 2 of No. 11; 4 of No. 12; 2 of No. 14; 2 of No. 15b; 1 of No. 16; 3 of No. 16a; 1 of No. 17; 1 of No. 18b; 1 of No. 20b; 2 of No. 24; 1 of No. 24a; 1 of No. 26; 1 of No. 26c; 1 of No. 27d; 1 of No. 32; 136 of No. 37a; 120 of No. 37b; 18 of No. 38; 2 of No. 45; 1 of No. 48; 3 of No. 48a; 1 of No. 50; 3 of No. 51; 2 of No. 52; 1 of No. 52a; 2 of No. 53; 14 of No. 59; 2 of No. 64; 1 of No. 65; 1 of No. 80a; 1 of No. 80b; 2 of No. 89a; 1 of No. 94; 1 of No. 95a; 1 of No. 96a; 2 of No. 103; 2 of No. 109; 5 of No. 111c; 2 of No. 115; 1 of No. 146a; 1 of No. 147b; 10 of No. 189; 2 of No. 196; 1 of No. 212; 2 of No. 222; 1 No. 1 Clockwork Motor.

Stamp Collectors' Corner—(*Continued from page 107*)

surrounding Turks and Caicos Islands. That is the kind of set that came out at the end of last year.

And how an examination of that set makes one long for a line and a boat, under that West Indian sun, on those smiling waters! Just look at those fish—red grouper, albacore, muttonfish, bonefish, snapper, permit fish and mackerel, and there are the spiny lobsters and, for good measure, a sky full of flamingoes and a fine Caicos sloop.

As I said at the beginning, these Islands have not got a very long philatelic history, and it is a fact that the early stamps will perhaps be beyond most of our pockets, but starting with the coronation set of 1937, and then going on from there, will result in a nice little lot of stamps, which will not prove too expensive, so here is a new short country, for anyone looking for a new Colony to collect.

Ice Caps and Rivers—(*Continued from page 92*)

manages to move forward at just under a yard a day.

In fact, so large are Antarctica's glaciers, and so slowly do they move that ice in the centre of the continent takes hundreds of thousands of years to reach the sea, where it breaks off in giant icebergs. From this it would seem that Man has lived with the glaciers for a very long time; undoubtedly they will remain with him for an equally long time to come.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

An Old Railway Tunnel

A traffic roundabout has been built on one of the main roads leading out of my home town of Harrogate. It is not generally known that under it runs an old railway tunnel that has not been used for nearly 100 years.

Originally Starbeck was the station for Harrogate, to which passengers were taken by omnibus. The first station in Harrogate itself was the Brunswick Station, the terminus of a branch line from Church Fenton on the York and North Midland Railway, which was approached by the great viaduct across Crimple Valley. This was replaced by the present station in 1862, when Brunswick Station, together with about a mile of railway, was abandoned.

The tunnel was on this section of line. It had been built in 1848, when the original Crimple Viaduct was constructed, and went out of use soon after the opening of the present station.

The bricked up entrance of an abandoned railway tunnel in Harrogate. Photograph by F. R. Joynson, Harrogate.

A friend and myself, having first obtained permission, went to have a look at the old tunnel. We reached it by going through the garden of a private house and scrambling down the side of what used to be the railway cutting leading to it. The cutting is now heavily overgrown, and it is not easy to imagine that trains once ran along it. But the tunnel still appeared to be in excellent condition and we walked along inside it for perhaps half a mile. Apart from a damp patch near the entrance it was quite dry. Smoke blackening could still be seen on the roof and although the rails had been removed the beds of the old sleepers were still clearly visible.

It gave one quite an eerie feeling as if our ancient train carrying equally ancient passengers would presently come rumbling along.

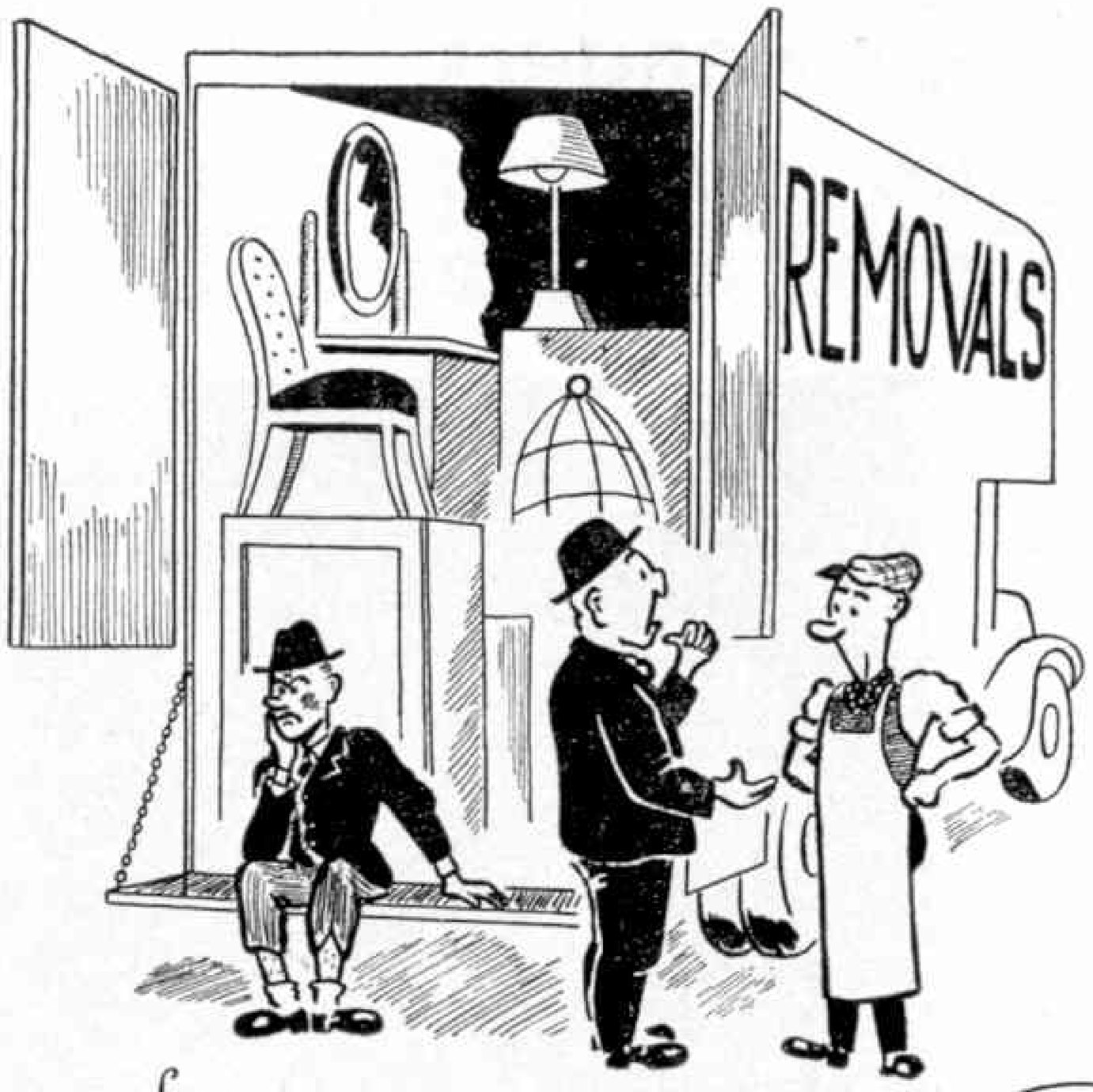
F. R. Joynson
(Harrogate).

The end of the road to All Alone. Photograph by Peter E. Firth, Bradford.

A Strange Road Name

I am sending you a photograph of a strange signpost near my home. It is at the end of a gravel covered road about a quarter of a mile long. *All Alone*, I believe, is the name of the farmhouse along the lane. It is by no means all alone now, as the name suggests, whatever its situation may have been when the lane was named. At one end there is a main road and nearby there is a fire station, a mineral water factory, a shopping centre and a flourishing housing estate.

Peter E Firth
(Bradford).



Summerfield

" 'e can't remember whether 'is new 'ouse is in Bath Road, York—or York Road, Bath!"

Policeman: "Pardon me sir, are you the owner of that Rolls-Royce?"
Man: "No officer, but thanks so much for asking me."

* * * *

"Don't stop me, I'm going to buy a car."
"Why the rush?"
"I just found a parking place."

* * * *

Out on the links a Scotsman was just getting ready to play. He said to the caddy: "Are ye guid at finding the balls?"
"Sure I am," answered the lad.
"Then," said the Scot, "find me one an' we'll begin to play."

* * * *

Eddy: "They raise the largest vegetables in the world in England."
Freddy: "How do you mean, the largest?"
Eddy: "Didn't you know? Recently a police inspector reported that he found two constables asleep on one beet?"

* * * *

A cannibal child on a South Sea island pointed to an aeroplane flying overhead and asked his mother what it was.
"It's like lobster," she explained. "You eat only what's inside."

* * *

"Jimmy," cried the little boy's mother, "you're a real hero! Your swimming teacher just called me and told me how you saved Arthur Jones from drowning in the pool today. I'm very proud of you."
"Aw, gee, Mom, it wasn't nuthin" blushed the boy. "I sort'a had to save him. I pushed him in."

Fireside Fun

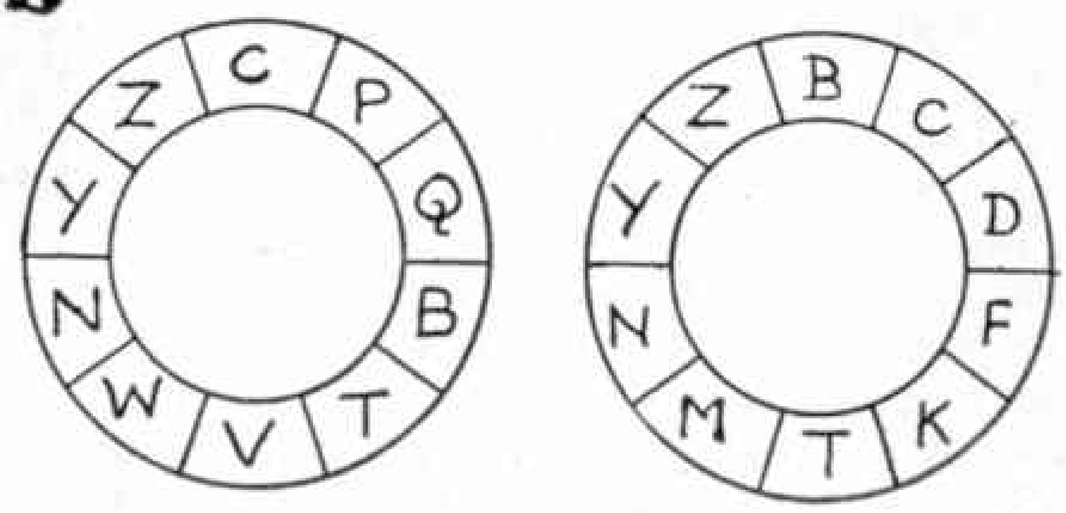
"Better to drive at 40
And live to 80;
Than drive at 80
And die at 40!"

* * * *

BRAIN TEASERS

A COMBINATION LOCK PUZZLE

A jeweller locked his preeious stones in a safe fitted with a combination lock that had three control dials lettered as shown below. To open the safe the pointers on the dials each had to be turned to point to a certain letter. These three letters formed a word to be found in an English dictionary. What was the word?



A HIDDEN PROVERB

There is a well known proverb hidden in the following sentence, every word of the proverb being hidden in its correct sequence. What is the proverb?

"When at last it chased one of the boys into a nearby hut, I merely tried to save some of the others who, even in eluding the angry bull, attempted to help their comrade."

* * * *

ANSWERS TO LAST MONTH'S PUZZLES

A Wild Flower Hunt

The names of the three wild flowers concerned are: 1. Bluebell. 2. Rock Rose. 3. Crowfoot.

Where Did They Go?

The places visited by the various children are as follows: 1. Cheddar. 2. Liverpool. 3. Hazlemere. 4. Newbury. 5. Rye. 6. Hull. 7. Swansea. 8. Sevenoaks. 9 Blackpool. 10. Hailsham.

It's more fun to
PLAY SAFE!

DON'T LET ACCIDENTS KEEP YOU OUT OF THE GAME

Going skating?
Don't fall in!
Make sure the ice
is not too thin

At winter sports
you must be bold
But wrap up warm
or you'll catch cold

It's fun to have
a snowball fight
But don't use stones—
it isn't right!

E141/7

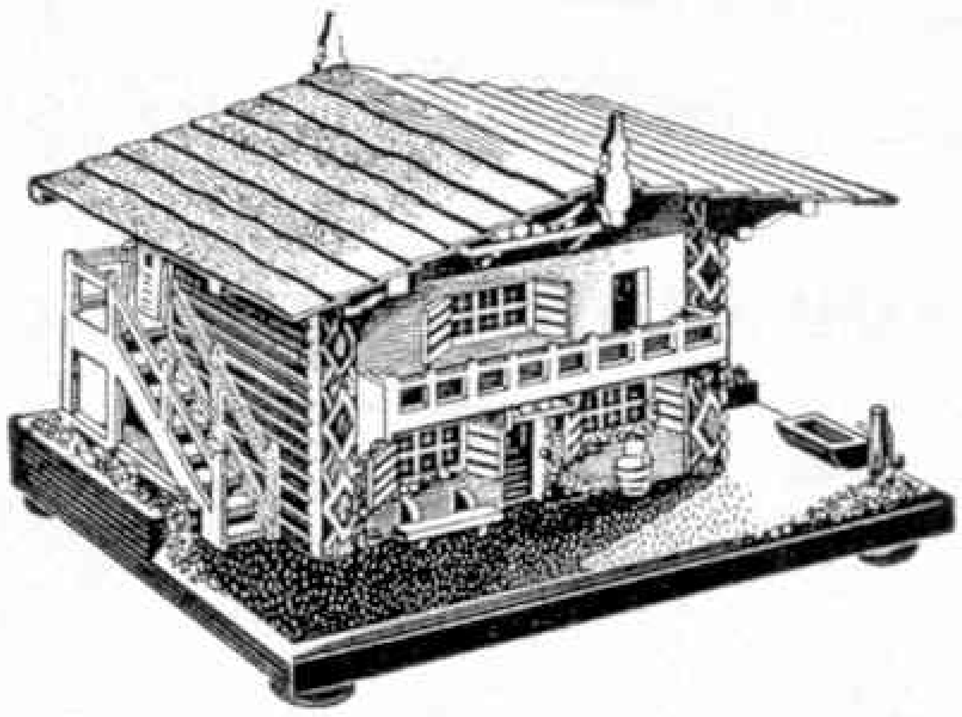
—AND HERE'S ANOTHER GOOD TIP! Remind Mother that chewing delicious Wrigley's Spearmint Chewing Gum is naturally good for your teeth and won't fill you up between meals. Ask her to buy you some today.

WRIGLEY'S SPEARMINT CHEWING GUM

Make Your Own
MUSICAL CIGARETTE BOXES etc.

with Hobbies **kits & outfits**

From branches, stockists, etc., or post free (see coupon).



SUPER SWISS CHALET

A highly decorative model of a two-storey Swiss chalet, 9 in. wide by 6½ in. high. Lift the hinged roof to offer a cigarette—and listen to sweet music. Kit for making the chalet itself includes all wood, materials, paint, glue, etc.—**19/11.**

Musical movements (choice of 20 tunes) **18/3** extra. Choose from (N) Home Sweet Home, (O) Auf Wiedersehn, (P) Greensleeves, (Q) O My Papa.

Kit No. 255 Special, **19/11**
Other models listed in FREE BOOKLET.

Another grand free design in
HOBBIES WEEKLY
12th Feb.—only 4½d.

Grand Piano Musical Cigarette Box. Another splendid model—make sure of your copy.

To HOBBIES LTD., 96 Dereham, Norfolk.

Please send free 20-page booklet and items marked thus X.

☐ Swiss Chalet Kit No. 255 Spcl. 19/11 ☐ Musical Movement (18/3) N...O...P...Q

Name .....

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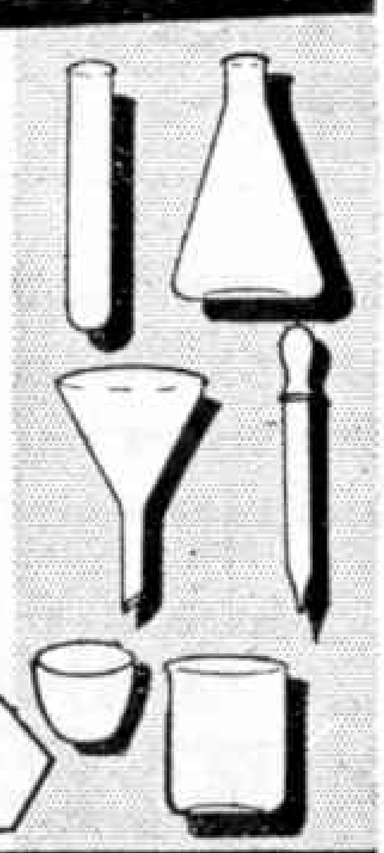
Convert your chemistry set to a student's laboratory by easy stages.

Supplies of spare apparatus and chemicals are now available.

Also Lott's Stone Puzzle together with book of 105 problems.

Ask to see them at your dealer or write to the manufacturers for current price list, enclosing 2d. stamped addressed envelope.



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LOTT'S BRICKS LTD
(Dept. M.M.4) WATFORD · HERTS

"OO" WAGON LOADS

Do not run empty wagons on your "00" railway all the time. These new scale loads will add to the realism of your freight trains. Obtainable from your Model Shop.

L/1. "I" GIRDERS, 18 ft. 6 in. long. Finished red oxide, grey or orange. 4 in a packet, **2/–**. Post 4d. L/2. OXYGEN CYLINDERS. Black with bright caps, 12 in a packet, **2/–**. Post 4d. L/3. ACETYLENE CYLINDERS. Red oxide, bright caps. 12 in a packet, **2/–**. Post 4d. L/4. PRE-CAST CONCRETE PIPE SECTIONS, 3 ft. dia., 4 ft. long. Shouldered ends to fit together. 4 in a packet, **2/–**. Post 4d. L/5. AIRCRAFT SALVAGE. Sections of wings, spars, etc., as cut up by flame cutters. Assorted packet, **2/6.** Post 4d.

Do not forget a "DERMIC" Oiler, **5/6.** Post 4d.

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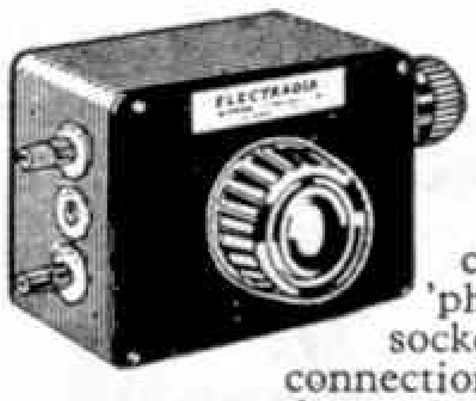

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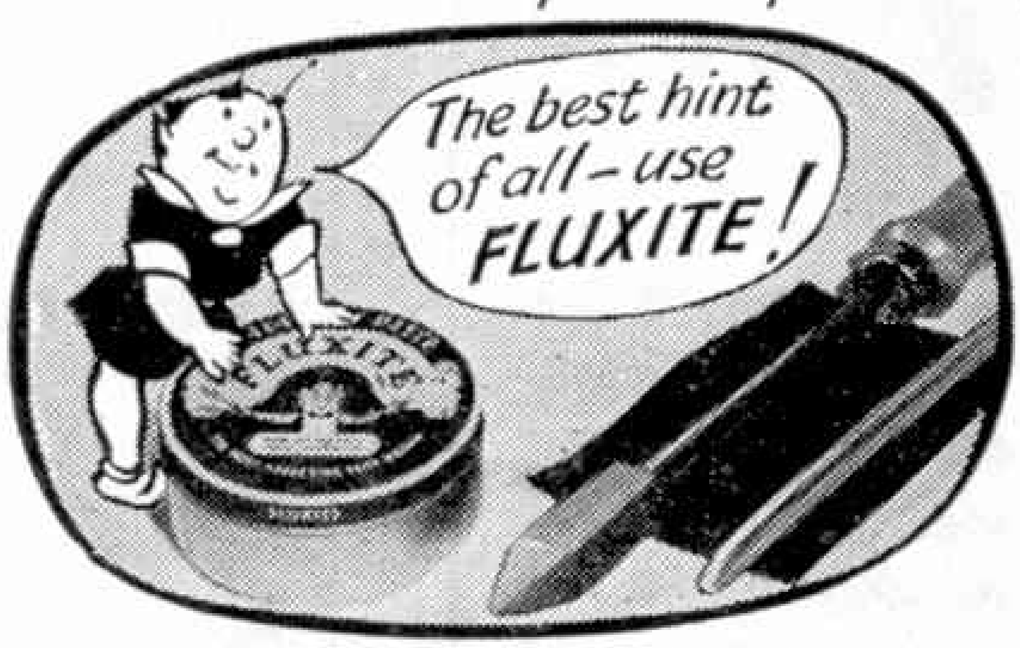

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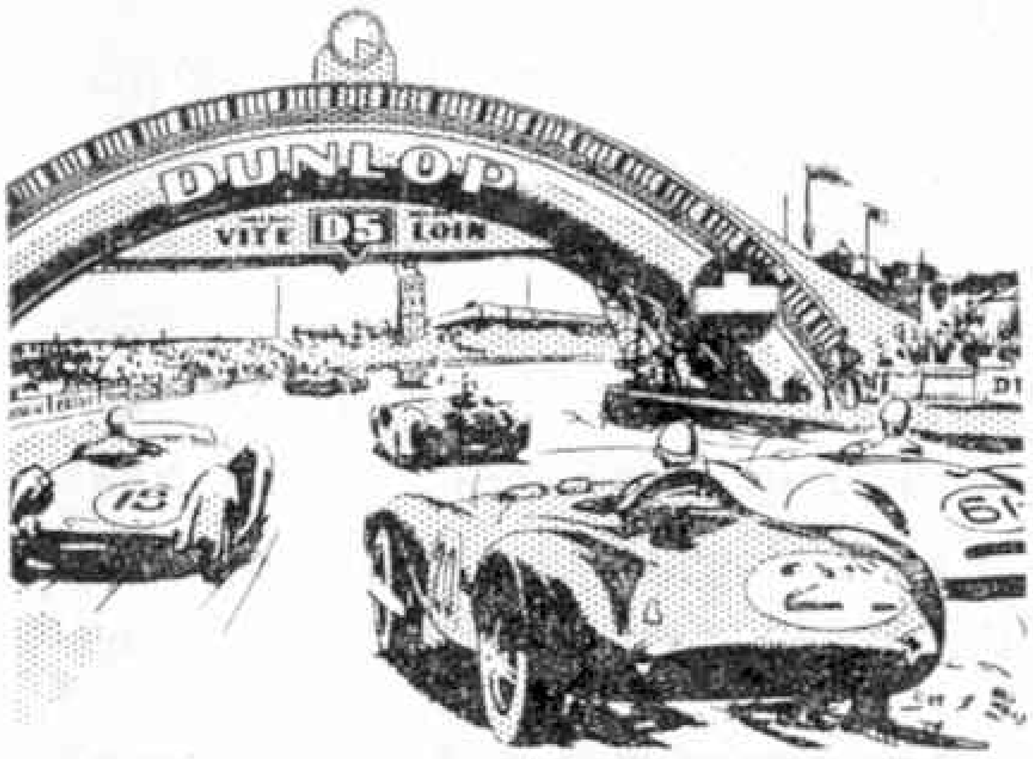

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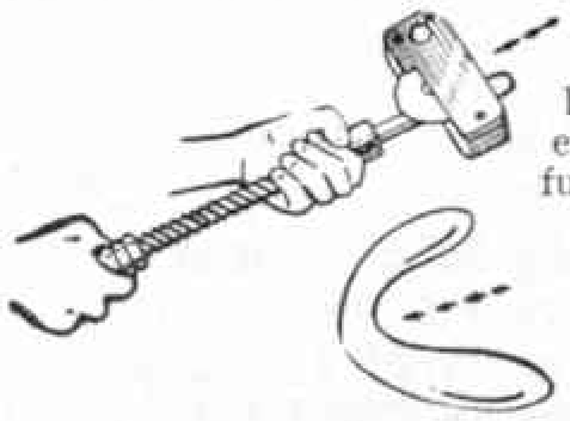

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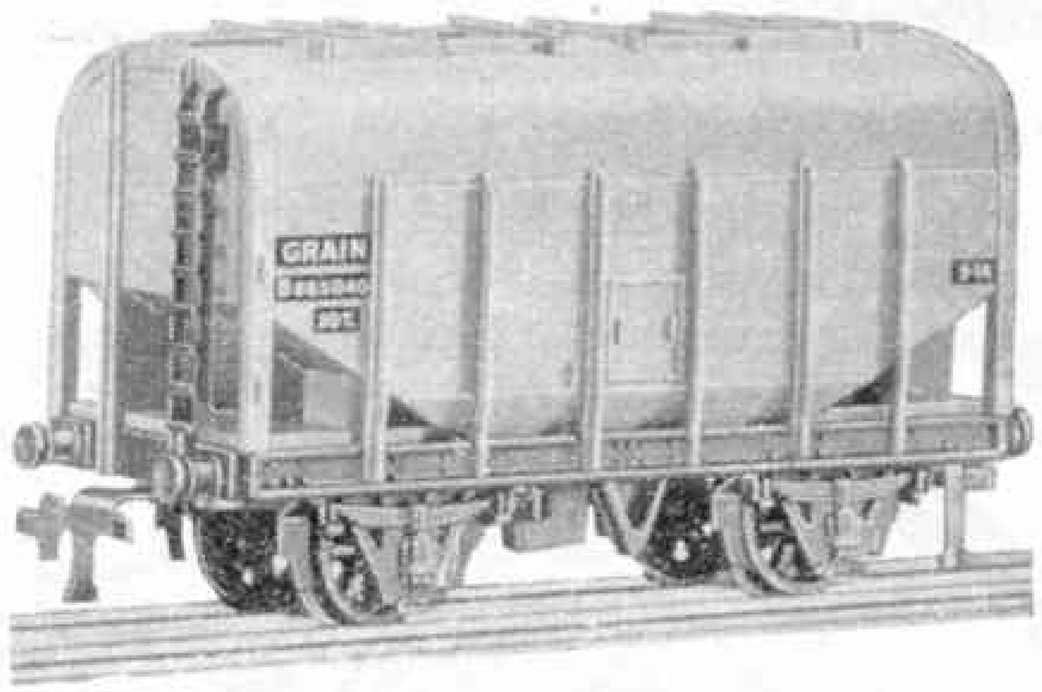

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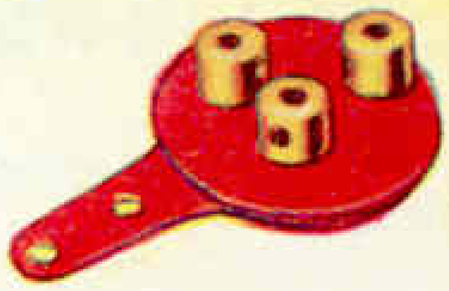

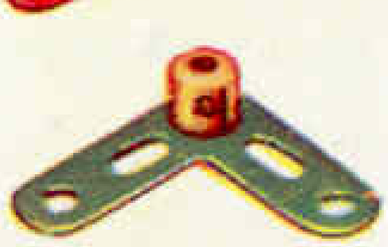

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6a	,,	6	,,	7	..	..	1	18	6
7a	,,	7	,,	8	..	..		4	7	6
8a	,,	8	,,	9	..	..		4	2	6
9a	,,	9	,,	10	..	..	22	10	0

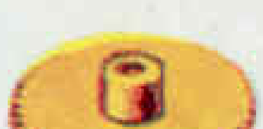
(Prices include Purchase Tax)

MECCANO GEARS OUTFIT 'B'

This Gears Outfit 'B', used in conjunction with a main Meccano Outfit, makes possible the building of a wider range of interesting mechanisms driven through gears, as in real engineering. The machine-cut brass gears, steel sprockets and Rod with Key-way in the Outfit have been selected as having the widest possible uses.

The various mechanisms, steering and reversing gears, etc., described and illustrated in the Instructions Book are quite simple to assemble and to fit into models.

Price 15/6 (inc. Tax)

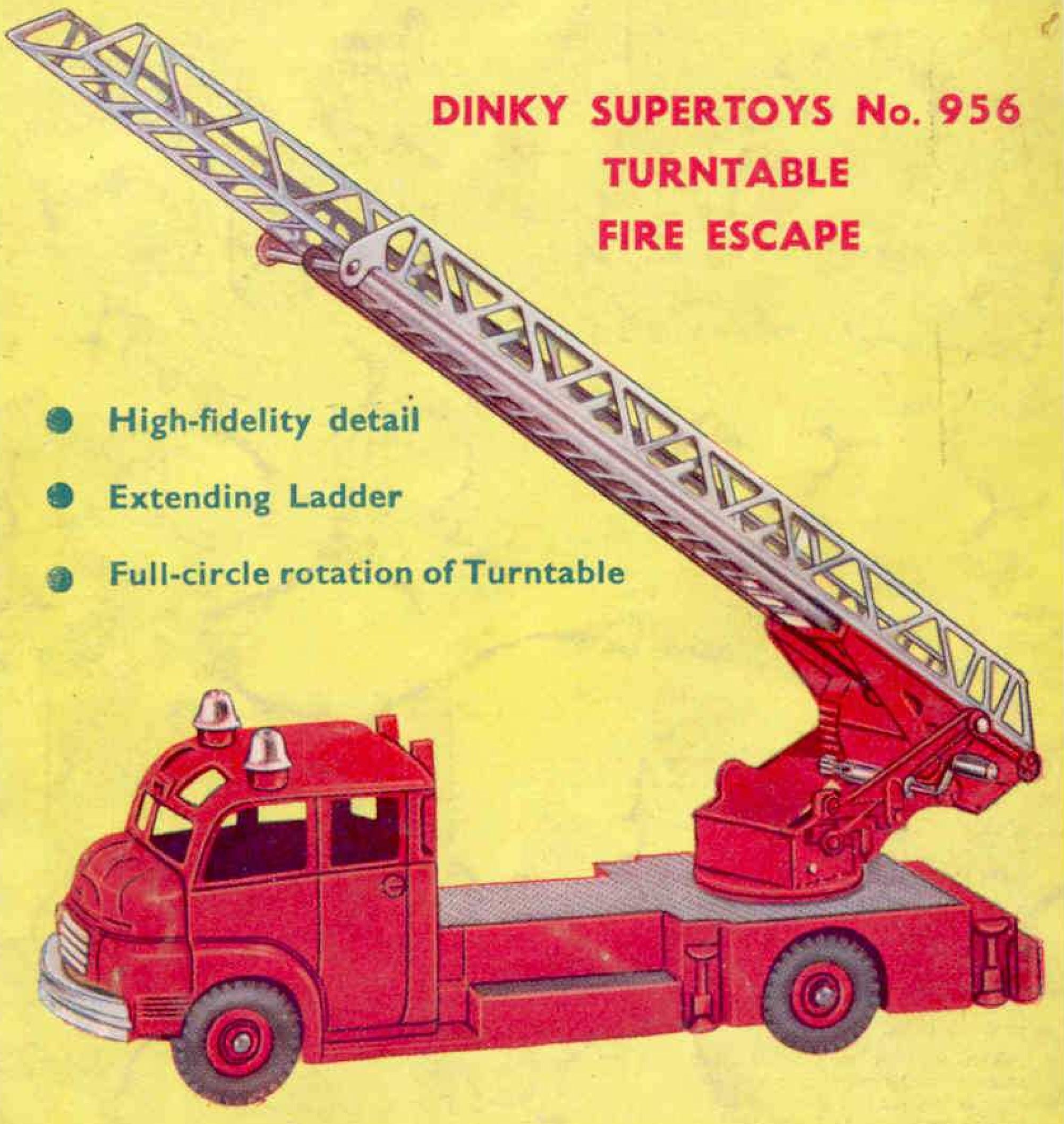


MADE IN ENGLAND
BY MECCANO LIMITED

DINKY SUPERTOYS

New

Ready during February



DINKY SUPERTOYS No. 956
TURNTABLE
FIRE ESCAPE

- High-fidelity detail
- Extending Ladder
- Full-circle rotation of Turntable

The fire service appliance represented by this attractive new miniature is an important item of modern fire fighting units. Brilliantly finished in red and silver, the model has an extending ladder which can be elevated and rotated to any required position. Bells, front bumper and a wealth of detail make this a very realistic auxiliary to Model No. 955 Fire Engine.

Overall length, 7¾ in. Length of Ladder (Extended), 14¾ in.

U.K. Price 13/6 (inc. tax)

MECCANO LTD., BINNS ROAD, LIVERPOOL 13

PUBLISHED BY MECCANO Ltd., BINNS ROAD, LIVERPOOL 13, ENGLAND.
Printed by John Waddington Ltd., Leeds and London.

MODEL OF THE MONTH

HEAVY DUTY CRANE (Outfit No. 9)

Illustrated in the February 1958 issue of the Meccano Magazine

Details of the Tower

Two sides of the base of the tower are each formed by a 12½" x 2½" Strip Plate edged by a 12½" Strip, and a built-up strip made from a 3½" and two 5½" Strips. A third side consists of a 12½" x 2½" Strip Plate strengthened by a 12½" Strip and a12½" Angle Girder. The fourth side is made by bolting two 5½" x 2½" Flexible Plates and a 3½" x 2½" Flanged Plate 1 to a 12½" Strip and a 12½" Angle Girder. The endsof the four sides are strengthened by 2½" Strips and the sides are connected together by two Angle Brackets at each corner.

A 12½" Angle Girder 2 is attached to each corner by a Fishplate, and these Girders are connected also to 7½" Angle Girders 3 by Fishplates. Two 7½" Strips 4 are attached to the Girders 3 by Angle Brackets. Each leg of the tower is braced as shown by two 12½" Strips. The top of the tower is filled in by two 5½" x 3½" Flat Plates 5 and two 5½" x 2½" Flat Plates 6, and to these Plates is bolted a 5½" x 2½" Flanged Plate 7. A 3" Pulley is arranged with its boss through the centre hole of a Wheel Flange, and these parts are fixed to the top of the tower by four bolts, one of which is indicated at 9. A Circular Girder 8 is bolted to the top of the tower.

Two 12½" Strips 10 are fixed to 1" x 1" Angle Brackets bolted between the sides of the tower. Two 3½" x 2½" Flanged Plates 11 are fixed to the Strips 10. The Plates 11 are joined at each end by 2½" x 1½" Flanged Plates, and at the top by a 5½" x 2½" Flanged Plate 12. The Plate 12 is connected to the sides of the tower by two 3½" x 2½" Flanged Plates. A Trunnion 13 is bolted to one of these Flanged Plates, and a Double Bent Strip is fixed to the centre of the Plate 12.

Assembly of the Boom

The centre section of each side of the boom consists of a 9½" Angle Girder 14 fitted at each end with a vertical 5½" Strip. The joins are strengthened by 2½" x 2½" and 3½" x 2" Triangular Flexible Plates. One of these Triangular Flexible Plates is swung clear in one of the pictures to show details of the boom bearing. The upper main girder of each side of the boom consists of two 12½" Angle Girders 15 joined by a 1½" Strip, and extended at the rear by a 3" Strip and a 4½" Strip 16. The joins between the main girder and the vertical 5½" Strips arestrengthened by 3½" x 2½", 2½" x 2" and 2½" x 1½" Triangular Flexible Plates.

At the front a 2½" Angle Girder 17 is bolted to each main girder, and this supports the outer end of a strip 18 made from a 3½" and three 5½" Strips. The rear end of the strip 18 is joined to the front of Girder 14 by a Fishplate.

A 4½" x 2½" Flexible Plate is bolted to the Strip 16, and is strengthened along its lower edge by another 4½" Strip 19. A 5½" x 3½" Flat Plate 20 is bolted to the Strips 16 and 19. The side of the boom is completed by a strip 21, made from two 5½" Strips overlapped two holes. A Flanged Sector Plate 22 is bolted to this strip and to the Plate 20.

The sides of the boom are connected by two 5½" Strips bolted to the Girders 17, by four 5½" x ½" Double Angle Strips 23, and by four 5½" x 2½" Flexible Plates placed face to face and bolted to the lower flanges of the Flanged Sector Plates 22.

Two 18½" Angle Girders 24 are bolted to the lugs of 3½" x ½" Double Angle Strips fixed to one of the Double Angle Strips 23 and to one of the 5½"

Strips bolted to the Girders 17. A Corner Gusset is bolted to each of the Girders 24, and these are connected by a 3½" x ½" Double Angle Strip. A 2" Pulley 25 is fixed on a 4½" Rod mounted in the Corner Gussets.

The Boom Bearing and Slewing Motion

A 4½" x 2½" Flat Plate, fitted with a Face Plate 26, is bolted to two 2½" x ½" Double Angle Strips 27 attached by their lugs to each of the Angle Girders 14. Four Double Brackets are bolted to a 3" Pulley 28. Two 5" Rods 29 are held in two of the Double Brackets by Collars and are supported at their outer ends in two of the Double Angle Strips 23. A ¾" Flanged Wheel is fixed on each Rod, and the outer Collar in each case is spaced from its Double Bracket by four Washers. Two 3½" Rods 30 are similarly fitted and are supported in the other two Double Brackets and in the Angle Girders 14.

An 11½" Rod 31 is extended by two 2½" Rods joined by Couplings and is mounted as shown. The upper end of Rod 31 is fixed in the Face Plate 26. The Flanged Wheels on the Rods 29 and 30 run on the rim of the Circular Girder 8, and the Pulley 28 rests on 21 Balls placed between the Wheel Flange and the rim of the Pulley held by the bolts 9.

The lower 2½" Rod is fitted with a 1½" Contrate 32 that engages a ½" Pinion on an 11½" Rod. The 11½" Rod is supported in the Flanged Plate 1 and the 2½" x 1½" Flanged Plates, and a 50-tooth Gear on the Rod is driven by a ¾" Pinion on a 4½" Rod 33. Rod 33 is mounted in the Flanged Plate 1 and a Trunnion 13, and it carries handles formed by two Pivot Bolts in a Bush Wheel.

Construction of the Cab

The sides of the cab are made by bolting 5½" Angle Girders to the ends of each of the Flat Plates 20. A 5½" Braced Girder is fitted to each side as shown. The front pair of 5½" Angle Girders is connected across by a 5½" Curved Strip and by a 5½" x 2½" Flexible Plate edged by two 5½" Strips. The rear pair of 5½" Angle Girders is similarly connected, but one of the 5½ " Strips is replaced by a built-up strip made from a 2½" and three 1½" Strips.

Details of the Winding Mechanism

Each of the two winding drums consists of a Cylinder fitted with two 1⅛" Flanged Wheels. Each drum is fixed on a 6½" Rod supported in the sides of the cab. One of the Rods carries a Collar, a ½" fixed Pulley 34, and a 57-tooth Gear 35. The other Rod is fitted with a Coupling, a 1" fixed Pulley 36, a 57-tooth Gear 37, and a Collar placed against the sideof the cab. The operating handle is a Pivot Bolt fixed in a Bush Wheel on a 6½" Rod 38. This Rod is able to slide endways in its bearings, so that a ½" Pinion 39 can be moved into mesh with either one of the Gears 35 and 37, to engage the drive to the corresponding winding drum.

A brake on the Pulley 34 is provided by a built-up strip 40, made from a 3" and a 2½" Strip overlapped two holes. This strip is lock-nutted to a 1½" Angle Girder bolted to the lower flange of one of the Flanged Sector Plates 22. The strip ishold against the Pulley 34 by a Driving Band stretched between short lengths of Cord tied to the strip and to the back of the cab.

A similar brake on Pulley 36 is provided by a 3" Strip 41, which is lock-nutted to an Angle Bracket bolted to the top flange of the Flanged Sector Plate. This Strip also is held against its Pulley by a Driving Band stretched between lengths of Cord.

The Travelling Carriage and Pulley Block

The crab, or travelling carriage, is made by bolting a 2½" x ½"

Double Angle Strip to each end of a 4½" x 2½" Flat Plate. The wheels are 1" Pulleys fixed on 4½" Rods, which are supported in the lugs of the Double Angle Strips. Two 2½" Strips 42, bolted together at a slight angle, are passed over the axles at each side, and to them is fixed a 1" x ½" Angle Bracket. The wheels travel on the edges of the Girders 24 and the short Bracket. The wheels travel on the edges of the Girders 24 and the short lugs of the Angle Brackets 43 slide underneath these Girders.

A Stepped Bent Strip is bolted to one end of the crab, and in it is supported a 1½" Rod that carries a ½" loose Pulley 44. Another ½" loose Pulley is free to turn on a 1" Rod supported in two Trunnions. A 2" Pulley 46 is fixed on a 2" Rod, which is held by Spring Clips in two Flat Trunnions. Each of these is attached to a Girder Bracket bolted underneath the 4½" x 2½" Flat Plate.

The pulley block consists of two Semi-Circular Plates connected by two Double Brackets. A 1½" Pulley 47 is fixed on a 1½" Rod, and a large Loaded Hook is suspended from a ¾" Bolt.

Arrangement of the cords

A length of Cord is tied to the rear end of the crab, is passed through a Channel Bearing 48 and is wound several times round the winding drum at the front of the cab. The Cord is then taken over the Channel Bearing 48, under the crab and round Pulley 25, and is tied to the front of the crab.

A length of Cord fastened to the rear winding drum is taken through a hole in the lower edge of the 5½" x 2½" Flexible Plate at the front of the cab. The Cord is taken over the Pulley 46 of the cab and round the Pulley 47 in the pulley block. The Cord is then passed over the Pulley 44, and is tied finally to the upper 5½" Strip at the front of the boom.

The parts required to build the Heavy Duty Crane are as follows:-

14 of No. 1	4 of No. 15	40 of No. 38	6 of No. 111a
2 of No. 1b	4 of No. 15a	2 of No. 38d	12 of No. 111c
24 of No. 2	1 of No. 15b	1 of No. 40	3 of No. 126
6 of No. 2a	2 of No. 16	1 of No. 44	2 of No. 126a
6 of No. 3	1 of No. 16a	1 of No. 45	1 of No. 137
8 of No. 4	1 of No. 17	6 of No. 48a	1 of No. 143
36 of No. 5	4 of No. 18a	4 of No. 48b	1 of No. 146a
4 of No. 6	1 of No. 18b	4 of No. 48d	3 of No. 147b
5 of No. 6a	2 of No. 19b	2 of No. 51	1 of No. 160
2 of No. 7a	4 of No. 20	2 of No. 52	2 of No. 161
10 of No. 8	4 of No. 20a	4 of No. 52a	21 of No. 168d
2 of No. 8a	4 of No. 20b	5 of No. 53	2 of No. 186
2 of No. 8b	1 of No. 21	2 of No. 53a	2 of No. 189
4 of No. 9	5 of No. 22	2 of No. 54	2 of No. 191
2 of No. 9d	2 of No. 23	1 of No. 57b	12 of No. 192
1 of No. 9f	1 of No. 23a	12 of No. 59	3 of No. 197
3 of No.10	2 of no. 24	2 of No. 62	2 of No. 213
6 of No.11	1 of No. 25	6 of No. 63	2 of No. 214
15 of No.12	2 of No. 26	2 of No. 70	4 of No. 215
4 of No. 12a	1 of No. 27	2 of No. 89	2 of No. 216
2 of No.12b	2 of No.27a	1 of No. 95b	2 of No. 221
8 of No.12c	1 of No. 28	2 of No.100	2 of No. 222
2 of No.13	8 of No. 35	2 of No. 108	2 of No. 223
1 of No.13a	327 of No. 37a	1 of No. 109	2 of No. 225
3 of No.14	303 of No. 37b	3 of No. 111	2 of No. 226